

CRPL-F 215 PART A

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PART A  
IONOSPHERIC DATA

ISSUED  
JULY 1962

✓  
U.S. U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS  
CENTRAL RADIO PROPAGATION LABORATORY  
BOULDER, COLORADO



## IONOSPHERIC DATA

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## IONOSPHERIC DATA

The CRPL-F series bulletins are issued as part of the responsibility of the Central Radio Propagation Laboratory for the exchange and dissemination of ionospheric and related geophysical data. While originally a by-product of the collection of data by the CRPL for use in radio propagation studies, the CRPL-F series bulletins, Part A, "Ionospheric Data," and Part B, "Solar-Geophysical Data," have provided useful service by collecting and making available a wide variety of data in convenient form for use in research, not only on radio propagation and the ionosphere, but also on a wide variety of geophysical problems. Beginning with CRPL-F 211, Part A, "Ionospheric Data," a number of changes have been made in the tables of ionospheric data which, by providing more information, should increase their usefulness.

The current form of the tables of ionospheric data provides the monthly medians and, in addition, the number of values entering into median determination (count) for all ionospheric characteristics listed. Also, the upper and lower quartile values, indicated by UQ and LQ in the tables, are listed for foF2, h'F2, h'F, and (M3000)F2. Quartile values are not listed for the other characteristics because of space limitations. The tables are prepared by IBM machine methods, which, by improving the speed and efficiency of preparation, permit earlier publication of the data.

Graphs of critical frequencies and (M3000)F2 will continue to appear. Graphs of percentage of time of occurrence for fEs and virtual heights of the regular ionospheric layers are no longer included. This change was necessary to provide space for the enlarged tables. Data on percentage of time of occurrence of fEs above 3, 5, and 7 Mc are still available from the CRPL and the IGY World Data Center A for Airglow and Ionosphere.

For many years, the tables of ionospheric data appearing in the F-series, Part A, listed values of medians recomputed at CRPL. While this practice enforced a certain uniformity, it was subject to some valid criticism for tampering with original data. The tables and graphs now show the ionospheric data just as they are provided by the originating laboratory. Responsibility for the accuracy and reliability of the data now rests entirely with the originator.

Gaps in the tables when data normally might be expected indicate the data were not provided by the originator. Following the recommendation of the World-Wide Soundings Committee, only values of median foEs are listed. In the few cases where fEs is still reported instead of foEs, the data will not be printed. Data will appear in the F-series, Part A, only when the complete daily-hourly tabulations have been received by the CRPL or the IGY World Data Center A for Airglow and Ionosphere.

Information on symbols, terminology, and conventions may be found in the "URSI Handbook of Ionogram Interpretation and Reduction, of the World-Wide Soundings Committee," edited by W. R. Piggott and K. Rawer (Elsevier, 1961), which supersedes previous documents. A list of symbols is available from CRPL on request.

The following table contains the latest available information on smoothed observed Zurich sunspot numbers, beginning with the minimum of April 1954. Final numbers are listed through June 1961, the succeeding values being based on provisional data.

Smoothed Observed Zurich Sunspot Number

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1954				3	4	4	5	7	8	8	9	12
1955	14	16	19	23	29	35	40	46	55	64	73	81
1956	89	98	109	119	127	137	146	150	151	156	160	164
1957	170	172	174	181	186	188	191	194	197	200	201	200
1958	199	201	201	197	191	187	185	185	184	182	181	180
1959	179	177	174	169	165	161	156	151	146	141	137	132
1960	129	125	122	120	117	114	109	102	98	93	88	84
1961	80	75	69	64	60	56	53	52	52	51	50	48
1962												

Units of Ionospheric Data Tables

foF2, foEs - - - Tenths of a megacycle  
 foF1, FoE - - - Hundredths of a megacycle  
 h'F2, h'F, h'E - Kilometers  
 (M3000)F2 - - - Hundredths

NOTE: Occasionally, when the median falls between two of the observed values, the median is carried an extra decimal place beyond these units. Those cases are easily identifiable by the extra digit appearing to the right of the number, in a column usually left blank.

MED - Median  
 CNT - Count  
 UQ - Upper Quartile  
 LQ - Lower Quartile

## WORLD - WIDE SOURCES OF IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 100 and figures 1 to 100 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL prediction of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

## Republica Argentina, Ministerio de Marina:

Trelew, Argentina  
Tucuman, Argentina  
Ushuaia, Argentina

Commonwealth of Australia, Ionospheric Prediction Service of the  
Commonwealth Observatory:  
Townsville, Australia

## Belgian Royal Meteorological Institute:

Dourbes, Belgium  
Lwiro (Central African Institute for Scientific Research)

Escola Politecnica, University of Sao Paulo:  
Sao Paulo, Brazil

## Defence Research Board, Canada:

Alert, Canada  
Clyde, Baffin I.  
Victoria, Canada  
Yellowknife, Canada

## Danish National Committee of URSI:

Godhavn, Greenland  
Narssarssuaq, Greenland

## French National Center for Telecommunications Studies:

Casablanca, Morocco  
Dakar, French West Africa  
Djibouti, French Somaliland  
Kerguelen I.  
Poitiers, France  
Tamanrasset, French W. Africa  
Tananarive, Madagascar  
Terre Adelie

Heinrich Hertz Institute, German Academy of Sciences, Berlin:  
Juliusruh/Rugen, GermanyInstitute for Ionospheric Research, Lindau Uber Northeim, Hannover,  
Germany:  
Tsumeb, South West AfricaIonospheric Institute, Breisach, Germany:  
Freiburg, Germany

The Royal Netherlands Meteorological Institute:  
Hollandia, Netherlands New Guinea

Icelandic Post and Telegraph Administration:  
Reykjavik, Iceland

Indian Council of Scientific and Industrial Research, Radio Research  
Committee, New Delhi, India:  
Ahmedabad (Physical Research Laboratory)  
Bombay (All India Radio)  
Calcutta (Institute of Radio Physics and Electronics)  
Delhi (All India Radio)  
Kodaikanal (India Meteorological Department)  
Madras (All India Radio)  
Tiruchy (All India Radio)  
Trivandrum (All India Radio)

Ministry of Postal Services, Radio Research Laboratories, Tokyo, Japan:  
Akita, Japan  
Tokyo (Kokubunji), Japan  
Wakkanai, Japan  
Yamagawa, Japan

Christchurch Geophysical Observatory, New Zealand Department of  
Scientific and Industrial Research:  
Campbell I.

Telecommunication Administration, Oslo, Norway:  
Svalbard, Norway

Manila Observatory:  
Baguio, P. I.

United States Army Signal Corps:  
Adak, Alaska  
Grand Bahama I.  
Thule, Greenland

National Bureau of Standards (Central Radio Propagation Laboratory):  
Anchorage, Alaska  
Boulder, Colorado  
Fairbanks (College), Alaska (Geophysical Institute of the  
University of Alaska)  
Pole Station, Antarctica

## TABULATIONS OF ELECTRON DENSITY DATA

Reduction of hourly ionospheric vertical soundings to electron density profiles has become a part of the systematic ionospheric data program of the Central Radio Propagation Laboratory, National Bureau of Standards. Scalings of ionograms for this purpose are being provided by ionosphere stations operated by several stations associated with CRPL. For the present, the hourly profile data from one CRPL station, Puerto Rico, are appearing in the monthly CRPL-F Reports, Part A. The very considerable task of scaling the ionograms for this purpose is being undertaken by T. R. Gilliland, Engineer in Charge, Puerto Rico Ionosphere Sounding Station; the computations are performed at the NBS Boulder Laboratories by a group headed by J. W. Wright. Basic conversion of virtual to true heights uses the well-known matrix method developed by K. G. Budden of the Cavendish Laboratory, Cambridge University, programmed by Dr. H. H. Howe for a CDC-1604 computer.

The tabulations provide the following basic electron density profile data for each hour of each day of the month:

<u>Quantity</u>	<u>Units</u>	<u>Remarks</u>
Electron Density (N)	$\times 10^3 = \text{electrons/cm}^3$	Body of table; given at each 10 km of height.
NMAX	$\times 10^3 = \text{electrons/cm}^3$	Always the highest value of N at each hour. To maintain this rule, the electron density at the next 10 km increment above HMAX is always given as exactly equal to NMAX (unless HMAX coincides with a 10 km level).
QUALification	(Alphabetic)	A standard scaling letter qualifying the observation when necessary.
KP		The standard Kp magnetic index, to one digit.
HMIN	Kilometers	The height of zero or very low electron density, obtained by linear extrapolation of the electron density vs. height curve.
SCAT	Kilometers	One half of the half-thickness of the parabola best fitting the upper portion of the F region profile. Approximates the scale height near the level HMAX.
HMAX	Kilometers	The height of maximum electron density, determined by fitting a parabola to the upper portion of the profile.
SHMAX	$\times 10^{10} = \text{electrons/cm}^2$ column.	Obtained by integration of the profile between the limits HMIN and HMAX.

Tabulations of the average electron densities each hour, at each 10 km level, for the quiet ionosphere, are also given. These averages include the profiles obtained when the magnetic character figure Kp is 4+ or less. The number of profiles entering the average for each hour is given by CNT. The other parameters of the layer, HMIN, SCAT, HMAX, SHMAX, and the mean value of Kp are given for each hour.

Before the averaging process, the individual profiles are extrapolated above HMAX by a Chapman distribution of 100 km scale height. This assumed model seems to agree well with the few published measurements dealing with the topside profile of the F-region.\* Extrapolation is necessary in order to calculate homogeneous averages near HMAX and the average profiles are, in fact, given up to 950 km. Also given are the average estimated integrated electron densities to infinity, SHINF (same units as SHMAX); this is an approximation to the total electron content in a column of the ionosphere.

\*See Wright, J. W. "A Model of the F-Region Above HMAX F2" J. Geophys. Res. V. 65, pp. 185-191.

## SPECIAL NOTICE

### Termination of Hourly Electron Density Profile Tabulations

Hourly  $N(h)$  profiles for the Puerto Rico station have been published in the CRPL-F Reports, Part A, since May 1959, starting with the data for February 1959. This program now terminates with the publication in this issue of the data for March 1962. It is believed that this program has satisfied the objective of making available a large volume of profiles produced by methods of conventional accuracy. However, in anticipation of the increasing precision required by modern applications, we intend to concentrate further work on the calculation of more accurate profiles, inevitably in smaller volume.







## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 h

7 MAR 1962

Time	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
Q,KP	3		3	3		2		52			2	
HMLN	247	237	234	218	205	229	234	110	108	102	107	107
SCAT	46.6	42.2	30.4	30.0	73.8	40.5	44.0	31.3	29.3	37.1	41.4	48.1
HNAxP	352	331	307	270	339	326	333	254	241	262	267	259
SHMAx	111	111	101	75	135	80	82	177	280	442	676	912
KM												
360	171											
350	171											
340	168	142			142		135					
330	166	142			142	137	135					
320	151	189			140	136	132					
310	136	174	234		137	131	126					
300	117	166	231		133	123	116					
290	93.8	147	215		127	110	101					1173
280	70.5	121	170	205	120	93.0	81.7					1171
270	48.7	87.5	156	205	111	74.7	61.7			602	971	1146
260	31.6	57.0	110	199	101	55.6	44.5	331		602	964	1096
250	15.3	33.6	58.9	182	89.7	38.6	30.2	330	489	587	929	1021
240		15.6	12.4	147	77.2	24.6	17.8	315	469	549	873	903
230				90.3	61.7	4.0		284	471	495	762	708
220				28.9	41.6			247	423	424	612	565
210								185	353	359	472	433
200					20.2			123	276	304	358	354
190								74.8	213	258	289	303
180								51.9	168	225	248	270
170								41.6	135	196	222	246
160								37.3	110	168	198	222
150								35.0	91.4	141	173	193
140								32.7	80.3	120	148	167
130								29.0	74.3	103	127	144
120								23.5	69.5	89.4	115	132
110								13.0	30.3	22.0	42.1	43.0

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 n

7 MAR 1962

TIME	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Q <sub>1</sub> KP	2	2	A1	A1	A1	A0	A0	A0	A1	1	1	2
HMLIN	108	108	109		109			200	199	211	266	278
SCAT	27.8	36.1	43.6		40.1			36.1	37.5	52.1	33.8	39.8
HMAKF	252	264	285		267			271	275	317	346	368
SHMAX	710	775	842		783			210	105	100	68	86
KM												
370												162
360												162
350											136	158
340											135	149
330											128	135
320										142	115	113
310										142	98.0	85.8
300										139	17.3	57.5
290			1055							133	55.8	33.5
280			1052					450	205	125	36.5	12.4
270		1184	1026		1240			450	204	114	18.1	
260	1292	1180	973		1232			440	146	99.8		
250	1290	1139	889		1187			413	181	83.3		
240	1230	1052	784		1105			368	159	64.9		
230	1085	908	664		980			298	130	43.6		
220	880	721	547		798			205	96.1	24.7		
210	624	560	444		557			103	60.3			
200	430	430	367		369			12.4	12.4			
190	340	342	315		277							
180	292	294	280		228							
170	259	265	253		198							
160	238	239	223		173							
150	221	199	178		148							
140	195	167	149		128							
130	158	153	137		113							
120	145	148	131		106							
110	81.4	69.4	39.4		41.8							

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

8 MAR 1962

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
W.K.P.	2		1		1	F	0	50				0
H.M.N.	233	223	247	211	207	197	237	110	110	107	109	109
SCAT	35.2	26.8	27.1	20.7	27.6	34.6	40.9	33.4	28.5	31.8	42.2	31.3
HY-AN	333	297	291	255	254	283	324	249	234	242	267	267
SHMAX	77	76	87	73	53	53	64	170	264	367	557	693
KM												
340	156											
330	156						117					
320	151						117					
310	140						114					
300	123	182	226				108					
290	99.1	178	226			95.4	97.4					
280	73.2	162	217			95.1	81.2					
270	45.7	138	193			91.8	60.4				707	1131
260	23.7	106	157	284	160	83.9	42.0				702	1120
250		70.1	108	273	160	75.7	27.3	281	491	567	678	1081
240		43.2	55.2	244	151	66.3	12.4	277	491	566	634	175
230		23.0	14.9		180	131	59.3	260	410	547	571	807
220				71.4	89.5	43.1		232	464	500	493	616
210					25.5	29.0		196	408	424	413	450
200						12.4		153	327	347	340	346
190								117	248	286	286	295
180								88.6	182	242	251	265
170								67.1	137	209	226	245
160								53.3	114	182	202	227
150								44.3	97.8	156	177	205
140								34.7	84.1	129	155	178
130								35.1	73.8	112	131	148
120								29.4	66.7	94.2	121	133
110								12.4	12.4	70.2	41.8	41.8

## ELECTRON DENSITY

RAPEY AFB, PUERTO RICO

60

8 MAR 1962

TIME	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
CRP	0	0	AU	A0	0	0	0	0	0	0	0	0
HM1N	109	109			108	108	108	200	199	198	234	230
SCAT	34.8	35.2			33.4	38.5	33.3	31.9	36.1	39.7	36.9	38.7
HMAXF	270	265			259	255	244	256	269	293	326	321
SHMAX	805	692			570	494	341	154	118	101	86	97
KM												
330											156	187
320											155	187
310											147	183
300										175	136	173
290										175	120	157
280	1217									171	99.6	134
270	1217	1031			307	744			259	161	77.5	103
260	1192	1026						392	295	145	55.1	68.6
250	1115	985			890	741	681	389	242	126	36.5	38.2
240	989	901			830	716	679	368	218	103	20.6	12.4
230	817	781			734	664	651	328	180	77.1		
220	643	639			593	592	592	255	122	57.4		
210	475	490			450	502	489	142	59.8	33.3		
200	370	377			348	394	330	12.4	12.4	12.4		
190	309	308			280	297	204					
180	274	271			238	227	127					
170	294	248			211	182	91.8					
160	237	225			166	154	73.6					
150	216	197			163	132	61.7					
140	170	163			142	114	53.5					
130	158	141			123	98.9	48.4					
120	140	131			115	91.3	45.7					
110	57.7	41.8			38.7	38.7	28.9					





## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

13 MAR 1962

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
Q <sub>RP</sub>	2	2	1	A1	1	2	82	S2	2	A2	2	F1
HMIN	225	228	231	218	210	202	205	110	109	106	108	
SCAT	35.1	34.2	35.3	22.9	27.1	23.1	39.9	26.2	41.7	41.9	49.1	
HMAXF	317	309	293	261	257	242	311	235	247	257	278	
SHMAX	136	100	106	74	66	22	48	134	282	439	615	
KM												
320	257						72.7					
310	254	204					72.7					
300	242	200	247				71.4					
290	218	187	247				67.0					
280	190	187	239				62.0				740	
270	155	139	222	259			55.9				735	
260	114	106	194	259	206		49.2			564	715	
250	73.0	69.1	147	244	203	77.9	42.1	383	560	677		
240	43.1	38.0	56.4	202	187	77.7	35.1	261	380	541	628	
230	20.2	12.4		125	191	72.6	28.5	259	367	507	556	
220				20.6	73.4	58.7	21.8	237	342	455	464	
210						33.1	12.4	207	309	393	376	
200								163	269	332	305	
190								118	228	281	259	
180								82.8	188	240	229	
170								61.8	155	206	200	
160								48.0	130	180	168	
150								40.8	112	158	145	
140								37.9	93.1	140	135	
130								32.6	77.1	120	129	
120								27.9	68.5	104	125	
110								13.0	24.1	74.5	85.7	

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

13 MAR 1962

TIME	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Q <sub>RP</sub>	01	1	0	0	0	1	B1	1	1	A1	F1	F0
HMIN	104	107	108	107	108	109		203	149	230	266	
SCAT	44.8	43.8	40.6	39.0	33.8	32.9		28.5	42.4	36.3	29.0	
HMAXF	265	213	283	276	259	253		264	280	319	337	
SHMAX	642	785	916	861	678	501		144	117	108	81	
KM												
340											189	
330											186	
320											197	171
310											193	150
300											183	118
290		870									165	81.4
280		669	1287							215	145	44.3
270	819	809	1294	1291					374	213	121	18.4
260	816	750	1184	1245	1131	898			372	204	92.8	
250	745	679	1075	1157	1109	896			351	168	58.7	
240	754	598	910	1018	1037	863			307	168	31.8	
230	692	513	711	822	915	790			233	141		
220	593	438	532	608	751	664			144	95.4		
210	477	375	403	438	552	500			62.9	44.9		
200	382	330	325	330	392	351				17.4		
190	316	299	282	275	294	242						
180	278	276	256	244	242	187						
170	254	256	238	220	211	157						
160	234	235	221	196	186	131						
150	208	212	203	171	163	111						
140	186	185	182	156	141	94.2						
130	172	166	160	136	123	83.1						
120	165	157	146	128	112	77.0						
110	68.9	61.5	69.4	87.8	69.4	41.8						

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

14 MAR 1962

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
Q <sub>RP</sub>	F0	F0	1	F1	A1	A1	F1	S1	1	1	1	1
HMIN	263	230	219	210	198	217	110	108	108	109	109	
SCAT	25.9	27.2	23.3	25.7	27.1	41.2	36.3	30.2	45.1	38.5	38.9	
HMAXF	314	285	264	257	270	315	242	232	244	263	276	
SHMAX	73	85	80	63	64	59	147	273	363	547	700	
KM												
320		197					94.1					
310		191					93.7					
300		169					91.0					
290		141	238				85.2					
280		101	237				77.4				976	
270		47.8	221	247		147	68.4				714	970
260			190	237	203	143	58.3				713	935
250			139	204	199	129	46.7	236	471	456	694	868
240			66.0	152	180	110	35.5	236	471	445	583	610
230				81.7	137	85.2	25.1	229	471	445	583	610
220				12.4	59.3	57.2	12.4	214	452	420	498	471
210					4	33.9		189	406	391	417	373
200						12.4		158	339	358	349	312
190								128	266	319	299	278
180								96.6	209	276	264	254
170								73.9	165	232	238	231
160								57.4	135	194	215	204
150								51.1	117	162	194	175
140								45.3	107	139	171	156
130								35.4	84.3	127	154	143
120								29.3	71.6	102	132	137
110								13.0	36.0	73.2	59.8	36.1

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

14 MAR 1962

TIME	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Q <sub>RP</sub>	1	1	A2	2	2	1	S1	1	2	2	2	3
HMIN	108	107		107	108	109		208	189	202	257	258
SCAT	34.8	38.6		35.2	38.9	36.0		25.9	34.0	44.4	43.8	35.1
HMAXF	274	278		266	267	264		268	266	291	360	348
SHMAX	765	649		781	717	562		285	210	119	107	102
KM												
360											171	
350											169	193
340											162	190
330											151	180
320											136	162
310											117	136
300											197	93.4
290											146	70.6
280	1105	1184									193	50.0
270	1101	1171		1257	1105	985			782	450	185	32.0
260	1060	1118		1247	1035	982			764	447	172	15.3
250	968	1027		1183	1050	948			686	427	155	
240	845	886		1081	966	877			568	387	135	
230	685	713		899	850	757			391	325	109	
220	536	563		691	694	572			178	249	77.4	
210	414	433		503	505	383			38.1	162	39.3	
200	339	349		363	362	264				67.3		
190	297	302		294	272	200				12.4		
180	270	273		256	227	164						
170	250	253		233	197	134						
160	227	232		211	167	107						
150	200	208		185	140	85.2						
140	175	182		155	121	76.6						
130	159	162		134	110	71.7						
120	151	151		123	104	69.6						
110	103	73.4		97.2	67.2	41.8						









## ELECTRON DENSITY

60 W

23 MAR 1962

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
Q,KP	0	0	1	0	1	3	3	3	2	2	1	1
HMFIN	231	209	220	209	208	267	286	110	109	109	107	108
SCAT	29.8	25.5	34.1	34.9	47.2	41.4	44.3	37.3	40.9	50.8	34.9	45.4
HMAXAF	303	271	286	277	312	354	378	266	259	287	287	301
SHMAXK	279	169	159	86	86	74	76	269	477	802	982	1301
380								122				
370								121				
360							128	118				
350							128	112				
340							124	104				
330							117	91.0				
320					129	106	75.2					
310					129	91.9	57.4					1696
300	681				126	75.0	36.7					1696
290	651		371		121	56.0	18.4			936	1398	1672
280	583	482	368	195	113	36.0				932	1384	1607
270	481	482	351	193	103	16.2		390		909	1315	1502
260	342	461	317	184	90.3			387	710	869	1189	1346
250	157	403	259	166	75.9			371	702	808	1032	1138
240	54.9	308	183	137	59.8			341	673	733	849	907
230		167	60.2	95.8	62.5			300	624	642	671	680
220		64.7	1.7	45.5	26.9			255	543	547	531	517
210		12.4		12.4	7.9			210	433	451	429	415
200								166	329	372	364	357
190								130	256	309	320	321
180								103	203	261	287	296
170								83.5	165	220	255	276
160								70.6	136	184	222	254
150								62.6	118	152	196	226
140								57.6	103	134	174	193
130								46.5	96.9	124	145	164
120								38.8	88.0	119	132	150
110								1.7	33.0	41.8	41.8	73.8

## ELECTRON DENSITY

RAMAY AF8, PUERTO RICO

60 W

23 MAR 1962

TIME	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
G <sub>K</sub> P	A1	81	0	0	0	0	0	0	3	20	3	1
H <sub>K</sub> MP		111	108	109	110	111	109	224	211	220	251	287
SCAT		39.3	43.8	36.3	39.0	45.1	37.8	39.1	37.9	38.6	48.6	41.3
H <sub>K</sub> A <sub>F</sub>		274	297	285	276	294	283	306	306	317	362	387
S <sub>H</sub> M <sub>A</sub>		1093	1195	979	857	885	638	476	392	274	307	291
KM												
370												494
380												490
370												463 472
360												463 436
350												456 395
340												439 345
330												410 284
320												375 213
310												430 325 144
300			1464			1163		927	651	470	269	66.5
290			1455	1372		1161	1031	893	621	432	208	24.6
280		1561	1410	1365	1173	1136	1029	828	571	382	140	
270		1540	1321	1311	1167	1083	999	730	507	322	78.0	
260		1468	1207	1202	1126	1000	929	596	424	257	37.2	
250		1345	1063	1064	1063	889	832	424	317	186		
240		1175	892	891	935	757	708	219	206	106		
230		961	735	720	810	612	563	59.7	106	44.4		
220		743	598	570	677	485	411		42.7	3.1		
210		571	493	451	548	377	281					
200		444	416	371	437	299	189					
190		362	362	321	352	247	132					
180		318	324	287	291	208	99.3					
170		289	293	258	248	176	78.9					
160		266	263	230	214	149	65.2					
150		240	234	202	183	126	57.8					
140		209	206	172	155	109	52.9					
130		176	181	151	136	99.1	49.6					
120		157	161	144	127	93.5	47.8					
110			81.8	88.1	12.4		21.8					

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

24 MAR 1962

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
G,K,P	1				1	1		1	2	2	2	2
HM1N	268	247	209	183	219	267	267	110	108	108	102	108
SCAT	37.3	32.3	28.4	50.0	68.8	57.1	41.3	39.0	27.1	45.1	44.8	37.9
HMAXF	363	317	266	247	353	376	359	258	247	267	289	267
SHMAX	245	193	176	88	76	69	57	276	421	495	1002	1054
KM												
380						42.3						
370		450				92.1						
360		450			81.9	90.6	95.8					
350		437			81.9	87.7	94.7					
340		408			81.2	83.0	90.7					
330		364			79.7	77.6	83.7					
320		309	448		77.3	70.3	74.4					
310		246	443		73.5	60.9	61.9					
300		176	418		69.6	50.4	49.1					
290		103	371		64.9	39.3	37.3				1229	1491
280	47.2	301			59.4	26.9	25.8				1217	1490
270	16.5	202	517		52.6	12.4	12.4			928	1176	1455
260		98.0	511		45.2			422		922	1101	1368
250		25.5	474	178	37.1			417	747	895	1002	1229
240			399	177	28.9			399	735	844	866	1036
230			226	172	20.6			366	673	770	725	835
220			81.5	165	3.3			319	571	664	598	647
210			12.4	154				255	452	531	486	504
200				127				198	352	421	406	409
190				50.5				154	277	339	349	352
180								120	222	283	311	315
170								94.6	181	239	279	288
160								77.1	149	202	247	262
150								66.0	125	172	215	234
140								59.8	108	151	184	202
130								46.5	96.9	135	162	172
120								40.5	90.8	126	152	159
110								4	49.1	90.1	122	81.2

## ELECTRON DENSITY

RAMEY AFB, PUERTO RICO

60 W

24 MAR 1962

TIME	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
G,KP	2	2	1	1	1	A1	A1	1	A2	2	2	3
HM1N	109	110	108	108	108	109	103	200	203	218	240	278
SCAT	40.7	39.7	46.9	45.5	35.8	42.8	36.0	47.2	44.3	46.4	50.9	31.5
HMAXF	29.	305	318	313	292	288	264	305	309	336	359	36.
SHMAX	1190	1253	1471	1485	1226	1220	755	589	416	303	272	173
KM												346
370												383
360												340
350												380
340												315
330												280
320												233
310												183
300												134
290	1561	1628	1709	1822	1877			923	681	399	298	133
280	1557	1576	1618	1742	1875	1877		900	649	335	213	82.7
270	1513	1464	1482	1614	1820	1859		856	605	294	162	16.5
260	1423	1319	1310	1443	1687	1791	1360	795	547	245	111	
250	1285	1132	1107	1230	1436	1667	1355	715	470	196	67.2	
240	1108	933	896	1003	1235	1504	1307	611	369	147	34.3	
230	909	756	702	791	973	1271	1203	483	262	73.5		
220	726	606	552	616	746	964	1048	333	166	47.7		
210	578	489	452	488	552	650	830	183	83.3	16.8		
200	467	4	390	403	414	409	589	81.5	34.8			
190	396	35.	348	350	334	293	369	12.4				
180	350	318	317	314	285	235	233					
170	318	291	290	287	251	199	159					
160	273	266	261	264	224	168	123					
150	267	236	227	241	200	141	101					
140	238	207	191	213	177	119	66.2					
130	204	186	173	182	154	104	75.0					
120	181	171	163	162	136	93.3	66.5					
110	167	164	157	152	127	87.4	61.9					
100	33.2	12.4	49.1	81.6	73.8	30.3	59.4					







## RAMEY AFB, PUERTO RICO 60 W 31 MAR 1962

Time	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
WPK	1		2	2	2	40		0		0	40	41
HMKN	235	221	217	210	207	223	239	112	106	108	105	107
SCAI	35.2	33.6	27.1	27.9	30.2	40.7	40.3	35.3	38.3	41.7	53.3	48.7
HMAXT	321	296	281	264	266	308	317	236	234	259	287	288
SHMAX	216	184	143	134	104	106	100	213	375	562	895	970
KM												
330	430						191					
320	430					197	180					
310	419											
300	388	411				195	183					
290	345	407	374			187	170				980	1173
280	284	386	374			174	149				977	1172
270	217	347	358	358	271	154	121				957	1155
260	133	281	316	349	269	127	65.9			747	919	1109
250	66.8	204	256	317	253	92.2	48.1			733	865	1040
240	26.9	108	174	264	222	54.5	12.4	414	544	710	793	344
230		42.7	76.6	187	166	25.8		411	542	659	703	822
220			25.1	87.8	87.5			390	573	586	600	814
210				12.4	25.5			358	534	494	502	552
200								300	474	412	421	446
190								199	398	342	360	366
180								114	308	289	315	316
170								77.6	234	246	283	284
160								61.2	182	214	253	259
150								48.6	145	188	225	233
140								43.2	116	164	199	206
130								40.7	93.2	135	171	172
120								34.3	84.3	115	144	148
110								68.1	49.1	126	141	141

## RAMEY AFB, PUERTO RICO 50 W 31 MAR 1962

[illegible]

RAMEY AFB, PUERTO RICO  
AVERAGE ELECTRON DENSITY  
COUNT  
TIME  
MAR 1962  
RP BELOW 4.5

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
COUNT	29	30	31	31	31	31	31	31	28	29	29	29
RP	1.5	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.9	1.9	1.9
HMN	234	234	216	211	223	241	111	108	108	108	107	107
RATIU	4.7	4.8	4.8	4.8	5.0	5.2	5.5	5.9	7.0	6.9	5.8	6.5
SCAT	36.9	32.5	31.2	30.9	41.3	41.6	32.9	35.0	43.5	45.7	42.0	42.0
NMAX	321	305	317	272	176	138	130	347	54.0	67.4	120.7	120.7
HMNAX	336	318	303	279	281	306	328	245	243	262	282	287
SHMAX	164	135	135	108	86	75	74	146	34.0	42.0	76.6	94.7
SHUP	1070	995	1029	876	638	465	441	1174	1864	2418	3372	4352
RP	35.0	21.2	20.2	15.6	11.2	9.2	9.7	17.0	36.2	35.8	54.6	74.3
950	27.2	26.0	25.7	18.5	12.5	11.6	12.5	21.0	48.0	46.4	69.4	91.3
900	34.7	32.7	32.7	23.7	18.5	15.9	17.2	23.2	59.0	58.9	81.9	121
850	42.7	42.7	42.7	33.0	23.7	17.5	20.4	25.8	85.4	75.7	101	159
800	52.7	52.7	52.7	42.3	30.4	25.0	26.1	36.0	111.0	97.1	124	198
750	67.5	67.5	67.5	56.7	42.3	30.4	25.0	36.0	111.0	97.1	124	198
700	86.1	86.1	86.1	70.0	56.7	42.3	30.4	36.0	111.0	97.1	124	198
650	110.3	110.3	110.3	89.4	69.2	49.7	40.7	42.4	144.3	116	159	251
600	139	118	114	88.1	63.3	51.7	53.7	46.2	169	203	307	413
550	173	149	143	112	80.2	65.2	67.4	122	189	257	369	522
500	214	185	179	141	101.1	83.4	155	239	324	488	654	907
450	256	225	220	173	125	99.0	101	193	279	403	604	807

RAMEY AFB, PUERTO RICO  
AVERAGE ELECTRON DENSITY  
COUNT  
TIME  
MAR 1962  
RP BELOW 4.5

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
COUNT	29	30	31	31	31	31	31	31	28	29	29	29
RP	1.5	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.9	1.9	1.9
HMN	234	234	216	211	223	241	111	108	108	108	107	107
RATIU	4.7	4.8	4.8	4.8	5.0	5.2	5.5	5.9	7.0	6.9	5.8	6.5
SCAT	36.9	32.5	31.2	30.9	41.3	41.6	32.9	35.0	43.5	45.7	42.0	42.0
NMAX	321	305	317	272	176	138	130	347	54.0	67.4	120.7	120.7
HMNAX	336	318	303	279	281	306	328	245	243	262	282	287
SHMAX	164	135	135	108	86	75	74	146	34.0	42.0	76.6	94.7
SHUP	1070	995	1029	876	638	465	441	1174	1864	2418	3372	4352
RP	35.0	21.2	20.2	15.6	11.2	9.2	9.7	17.0	36.2	35.8	54.6	74.3
950	27.2	26.0	25.7	18.5	12.5	11.6	12.5	21.0	48.0	46.4	69.4	91.3
900	34.7	32.7	32.7	23.7	18.5	15.9	17.2	23.2	59.0	58.9	81.9	121
850	42.7	42.7	42.7	33.0	23.7	17.5	20.4	25.8	85.4	75.7	101	159
800	52.7	52.7	52.7	42.3	30.4	25.0	26.1	36.0	111.0	97.1	124	198
750	67.5	67.5	67.5	56.7	42.3	30.4	25.0	36.0	111.0	97.1	124	198
700	86.1	86.1	86.1	70.0	56.7	42.3	30.4	36.0	111.0	97.1	124	198
650	110.3	110.3	110.3	89.4	69.2	49.7	40.7	42.4	144.3	116	159	251
600	139	118	114	88.1	63.3	51.7	53.7	46.2	169	203	307	413
550	173	149	143	112	80.2	65.2	67.4	122	189	257	369	522
500	214	185	179	141	101.1	83.4	155	239	324	488	654	907
450	256	225	220	173	125	99.0	101	193	279	403	604	807

RAMEY AFB, PUERTO RICO  
AVERAGE ELECTRON DENSITY  
COUNT  
TIME  
MAR 1962  
RP BELOW 4.5

TIME	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100
COUNT	29	30	31	31	31	31	31	31	28	29	29	29
RP	1.5	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.9	1.9	1.9
HMN	234	234	216	211	223	241	111	108	108	108	107	107
RATIU	4.7	4.8	4.8	4.8	5.0	5.2	5.5	5.9	7.0	6.9	5.8	6.5
SCAT	36.9	32.5	31.2	30.9	41.3	41.6	32.9	35.0	43.5	45.7	42.0	42.0
NMAX	321	305	317	272	176	138	130	347	54.0	67.4	120.7	120.7
HMNAX	336	318	303	279	281	306	328	245	243	262	282	287
SHMAX	164	135	135	108	86	75	74	146	34.0	42.0	76.6	94.7
SHUP	1070	995	1029	876	638	465	441	1174	1864	2418	3372	4352
RP	35.0	21.2	20.2	15.6	11.2	9.2	9.7	17.0	36.2	35.8	54.6	74.3
950	27.2	26.0	25.7	18.5	12.5	11.6	12.5	21.0	48.0	46.4	69.4	91.3
900	34.7	32.7	32.7	23.7	18.5	15.9	17.2	23.2	59.0	58.9	81.9	121
850	42.7	42.7	42.7	33.0	23.7	17.5	20.4	25.8	85.4	75.7	101	159
800	52.7	52.7	52.7	42.3	30.4	25.0	26.1	36.0	111.0	97.1	124	198
750	67.5	67.5	67.5	56.7	42.3	30.4	25.0	36.0	111.0	97.1	124	198
700	86.1	86.1	86.1	70.0	56.7	42.3	30.4	36.0	111.0	97.1	124	198
650	110.3	110.3	110.3	89.4	69.2	49.7	40.7	42.4	144.3	116	159	251
600	139	118	114	88.1	63.3	51.7	53.7	46.2	169	203	307	413
550	173	149	143	112	80.2	65.2	67.4	122	189	257	369	522
500	214	185	179	141	101.1	83.4	155	239	324	488	654	907
450	256	225	220	173	125	99.0	101	193	279	403	604	807









TABLE 17

AKITA, JAPAN 139.7N, 140.1E)

TIME 135.0E

[illegible]

SWEEP 1.6 MC TU 20.0 MC IN 20 SECONDS.

SEPTEMBER, 1959

TABLE 19

YAMAGAWA, JAPAN 131.2N, 130.4E)

TIME 135.0E

	hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
f6F2	MED	89	85	81	74	57	61	72	99	110	111	118	128	135	138	136	131	132	132	129	126	134	96	100	95
	CNT	92	93	88	83	72	66	80	110	116	119	126	136	139	146	143	129	127	127	126	127	27	25	25	24
	LO	78	76	70	66	60	56	67	98	106	106	112	122	128	129	130	127	126	123	125	111	94	90	86	81
f6F2	MED									400	330	315	340	340	330	330	300								
	CNT								1	9	18	22	24	27	23	16									
	LO																								
f6F	MED	300	300	300	270	270	275	280	245	240	230	225	215	230	230	240	250	250	250	260	250	240	270	290	290
	CNT	29	28	28	29	28	24	29	29	29	28	27	28	28	28	28	27	26	27	27	29	28	28	28	29
	LO																								
(M3000)F2	MED	255	250	255	270	265	255	270	315	310	295	270	270	270	270	265	265	270	280	290	290	270	255	255	250
	CNT	23	26	28	28	28	29	29	29	28	27	27	28	28	27	28	27	27	27	26	28	27	25	25	24
	LO																								
f6FI	MED									660	670	660	650	640	600		U								
	CNT									1	7	6	6	2	1										
	LO																								
f6E	MED						155	250		315	350	370	385	390	390	395	370	330	380	220					
	CNT						1	27	26	22	20	18	17	17	19	19	23	26	26	7					
	LO																								
f6E	MED																								
	CNT																								
	LO																								
f6E1	MED	30	30	21	20	13	20			38	43	40	44	44	43	45	41	38	36	30	36	30	30	36	30
	CNT	19	21	27	29	29	25	25	29	28	25	25	27	28	28	27	27	28	26	27	23	23	18	18	
	LO																								

SWEEP 1.0 MC TO 20.3 MC IN 30 SECONDS.

SEPTEMBER, 1959

TABLE 18

TOKYO, JAPAN 135.7N, 139.5E)

TIME 135.0E

[illegible]

SWEEP 1.0 MC TO 20.0 MC IN 20 SECONDS.

SEPTEMBER, 1959

TABLE 20

DOURDES, BELGIUM (50.1N, 4.6E)

TIME 0.0

[illegible]

SWEEP 1.0 MC TO 25.0 MC IN 30 SECONDS.

JULY, 1959







TABLE 33

ALERT, CANADA (82.4N, 62.0W)

ALERT, CANADA (82,CNT, 62,SW)																	TIME 75.5W							
HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	MED	68	66	60	74	73	66	72	69	70	72	72	74	76	78	77	74	70	70	71	70	67	66	
	CNT	24	25	26	26	26	26	26	26	25	25	25	25	27	27	27	27	28	28	27	26	26	25	25
	U																							
	LO																							
16F2	MED					2	1						U	410	4	6	2	3	1			1	1	
	CNT																							
	U																							
	LO																							
16F	MED	200	280	280	280	280	280	270	280	270	270	270	260	260	270	270	280	280	280	280	280	280	280	280
	CNT	23	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
	U																							
	LO																							
163000F2	MED																							
	CNT																							
	U																							
	LO																							
16F1	MED	1	1	1	1	1	2	2	1	4	3	420	460	4	6	6	4	3	1	1	1	1	1	
	CNT																							
	U																							
	LO																							
16E	MED	100	170	180	180	190	220	220	240	250	250	260	260	260	260	260	260	260	260	260	260	260	260	170
	CNT	19	16	18	19	23	22	22	24	23	20	20	20	20	20	20	20	20	20	20	20	20	12	11
	U																							
	LO																							
16E	MED					U	400	430	420	410	420	410	410	410	420	420	410	400	400	400	400	400	400	400
	CNT						14	16	15	18	17	16	16	17	15	15	16	17	15	16	16	15	15	15
	U																							
	LO																							
16E1	MED																							
	CNT																							
	U																							
	LO																							

SWEEP 1.4 MC TO 20.0 MC IN 15 SECONDS.

SEPTEMBER, 1958

TABLE 34

YELLOWKNIFE, CANADA (62.4N, 114.0W)

HOUR	TIME 105.0W																							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	58	57	62	55	55	56	55	60	65	74	80	81	83	88	87	86	87	81	86	77	68	54	56	54
CNT	22	23	23	21	24	25	25	25	23	21	22	25	25	25	25	28	28	28	26	27	26	25	26	26
U																								
16F2													U	470	470	450	420	U						
CNT																								
U																								
16F	300	310	310	315	305	305	310	290	270	260	260	260	250	240	240	240	250	270	270	280	300	340	300	320
CNT	22	20	21	23	21	22	19	17	18	13	19	19	24	22	22	24	22	23	24	25	26	23	23	23
U																								
16F																								
CNT																								
U																								

SWEEP 1.4 MC TO 20.0 MC IN 15 SECONDS.

SEPTEMBER, 1958

TABLE 35

DELHI, INDIA (28.4N, 77.2E)

DELHI, INDIA (28.4°N, 77.2°E)																	TIME 75.0°E							
HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	MED	590	88	71	0	0	0	0	123	127	135	149	0	0	0	0	0	0	0	0	0	0	0	0
CNT	27	21	19	20	25	27	27	19	19	23	23	16	21	29	17	26	28	25	21	25	25	26	25	25
UQ	UQ																							
16F2	MED																							
CNT	240	280																						
UQ	UQ																							
16F	MED																							
CNT	5	5	3	3	5	6	9	8	10	15	18	8	4	4	275									
UQ	UQ																							
16F1	MED																							
CNT	240	280																						
UQ	UQ																							
16E	MED																							
CNT	240	280																						
UQ	UQ																							
16E	MED																							
CNT	240	280																						
UQ	UQ																							

SWEEP 1.4 MC TO 10.0 MC IN 5 MINUTES, MANUAL OPERATION.

SEPTEMBER, 1958

TABLE 36

AMHERST, INDIA (23.0N, 72.4E)

AMCERAO, INDIA (23-0N, 72-6E)																	TIME 75.5E							
HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	MED	134	128	91	74	70	67	83	119	120	122	133	146	150	153	153	153	143	142	151	151	150	150	132
	CNT	17	18	17	18	18	20	22	19	21	26	28	16	21	22	22	16	20	23	17	25	10	16	15
	U																							
16F2	MED									245	275	350	400	450	440	425	400	350	260	275				
	CNT									23	23	25	20	21	21	21	21	21	20	26				
	U																							
16F	MED	275	260	250	250	260	270	240	240	225	215	215	210	210	210	210	210	210	210	210	210	210	210	210
	CNT	22	20	20	20	20	21	22	21	17	14	9	10	9	9	9	9	9	9	9	9	9	9	9
	U																							
(M3000F2	MED	275	240	300	275	270	275	290	310	300	260	245	240	235	235	240	245	250	255	245	250	260	265	270
	CNT	16	17	18	17	17	18	19	19	21	26	22	16	18	17	13	6	12	15	20	20	14	10	16
	U																							
16FI	MED									500	500			2	2	1	2	1	3					
	CNT									3														
	U																							
16E	MED								170	250	310	370	400	410	420	420	410	400	350	270	200			
	CNT								2	14	12	14	10	6	5	4	7	11	14	3				
	U																							
16E	MED								115	115	115	115	110	110	110	110	110	115	115	115				
	CNT								15	17	15	16	8	7	1	3	5	10	16					
	U																							
16Es	MED	E	E	E	E	E	E	E	G	G	G	G	G	G	G	G	G	G	32	10	24	16	16	22
	CNT	20	20	19	18	19	20	22	20	21	24	23	21	21	21	23	20	23	22	25	24	24	19	24
	U																							

SWEEP 0.4 MC TO 25.0 MC IN 5 MINUTES, AUTOMATIC OPERATION.

SEPTEMBER, 1958



TABLE 41

KOOAIKANAL, INDIA (10.2N, 77.5E)

COO TAIL - INDIA (10-2N, 77-5E)																								TIME 79-0-5			
HOUR		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
T6 F2	MED	116	111	98	87	89	58	79	113	170	133	126	132	120	125	138	126	138	126	126	135	145	127	128			
	CNT	14	11	10	10	19	19	28	30	30	28	24	24	24	24	23	28	29	29	29	27	20	5	4	1		
	LO																										
T6 F2	MED																										
	CNT																										
	LO																										
T6 F	MED	260	240	240	230	230	220	265	240	230	220	220	215	215	215	220	225	285	265	230	465	430	360	320	285		
	CNT	30	30	30	30	29	30	30	30	30	29	24	24	24	24	23	25	28	29	29	30	28	21	24	26		
	LO																										
(M3000) F2	MED	285	285	280	300	210	315	295	285	250	220	215	215	210	255	205	210	210	215	210	205	200	205	280			
	CNT	14	17	15	20	19	19	28	30	30	29	24	24	24	24	23	26	29	29	29	27	20	5	4	6		
	LO																										
T6 F1	MED																										
	CNT																										
	LO																										
T6 E	MED							300	119	3	1																
	CNT							18	112																		
	LO							1	26	14	8	1	1	2	110	115	115	120	113	5							
T6 E	MED																										
	CNT																										
	LO																										
T6 E1	MED	28	1				57	50	97	108	116	118	114	114	110	106	86	76									
	CNT	4	5	1		1	5	30	30	29	23	23	24	23	26	29	29	24									
	LO																										

TABLE 42

TRIVANDRUM, INDIA 16.5N, 77.0E)

[illegible]

TABLE 43

TOWNSVILLE • AUSTRALIA (19.35, 146.7E)

[illegible]

TABLE 6

VEILLOUX NICE. CARNAC 162-68- 334-684

[illegible]













TABLE 60

SAO PAULO, BRAZIL (23°45'S, 46°51'W)

TIME 1450H

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
16F2	MED	U	124	116	102	92	87	83	90	98	104	107	114	119	126	130	131	134	131	134	131	132	132	134	132
	CNT	U	10	9	14	13	14	19	25	25	25	25	25	24	23	25	25	26	27	27	27	26	10	8	
	LO																								
16F2	MED	U	340	310	300	285	255	260	250	240	230			2	2	1		240	270	310	420	400	360	350	
	CNT	U	25	25	24	24	24	24	25	25	25	3	2					20	22	26	26	25	27	23	
	LO																								
16F	MED																								
	CNT																								
	LO																								
16A00001F2	MED	U	270	270	280		280	270	280	260	240	220	220	230	240	240	230	240	260	240	230	220	250	240	
	CNT	U	10	9	11	11	12	14	21	21	24	20	22	21	21	22	22	22	24	24	21	16	20	17	
	LO																								
16F1	MED																								
	CNT																								
	LO																								
16E	MED																								
	CNT																								
	LO																								
16E	MED																								
	CNT																								
	LO																								
16E	MED																								
	CNT																								
	LO																								

DECEMBER, 1956

SWEEP 1.25 MC TO 20.0 MC IN 10 MINUTE.

TABLE 72

TERRE ARCELIE 186°7'N, 146°0'W

TIME 0400

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	U 68 70 74 64 MED CMT LO	U 4 7 3 2	U 73 71 70 70	U 5 8 12 14	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68	U 70 72 67 68
16F2	U 600 500 400 300 MED CMT LO	U 12 18 20 16	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21
16F2	U 215 210 210 210 MED CMT LO	U 16 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21	U 21 21 21 21

DECEMBER, 1956

SWEEP 1.2 MC TO 17.0 MC IN 1 MINUTE.

TABLE 78

FREIBURG, GERMANY (48°14'N, 7°46'E)

TIME LOCAL

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	U 54 53 54 51 MED CMT LO	U 30 29 30 30	U 46 40 42 40	U 30 30 30 30	U 86 128 132 134	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28
16F2	U 245 245 245 245 MED CMT LO	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30
16F2	U 290 302 305 300 MED CMT LO	U 10 28 28 28	U 267 250 255 235	U 28 28 27 28	U 222 220 220 222	U 225 225 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230

DECEMBER, 1956

SWEEP 1.25 MC TO 20.0 MC IN 10 MINUTE.

TABLE 72

POITIERS, FRANCE (46°38'N, 0°32'E)

TIME 0400

HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
16F2	U 54 53 54 51 MED CMT LO	U 30 29 30 30	U 46 40 42 40	U 30 30 30 30	U 86 128 132 134	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28	U 29 28 28 28
16F2	U 245 245 245 245 MED CMT LO	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30	U 25 30 30 30
16F2	U 290 302 305 300 MED CMT LO	U 10 28 28 28	U 267 250 255 235	U 28 28 27 28	U 222 220 220 222	U 225 225 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230	U 230 230 230 230

DECEMBER, 1956

SWEEP 1.2 MC TO 17.0 MC IN 1 MINUTE.















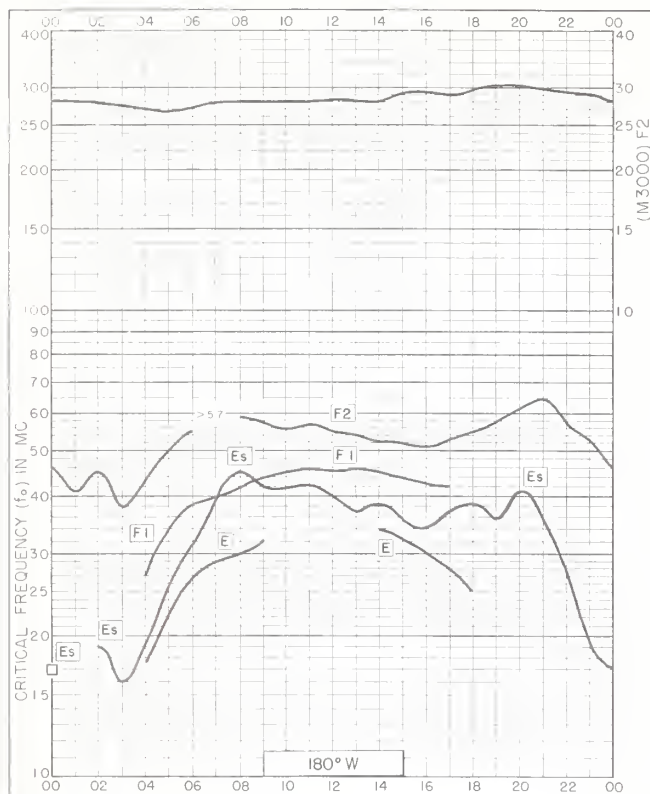


Fig. 1. ADAK, ALASKA  
51.9°N, 176.6°W

JUNE 1961

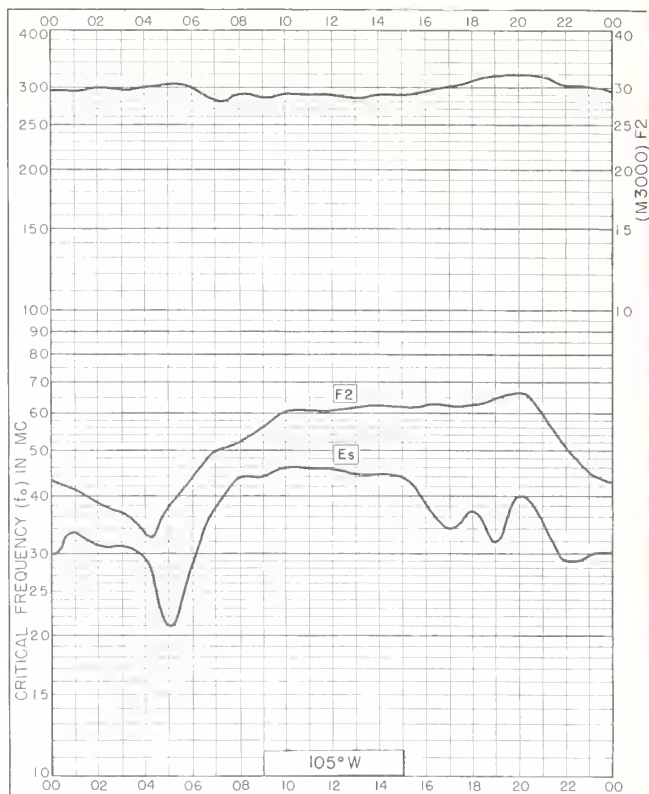


Fig. 2. BOULDER, COLORADO  
40.0°N, 105.3°W

JUNE 1961

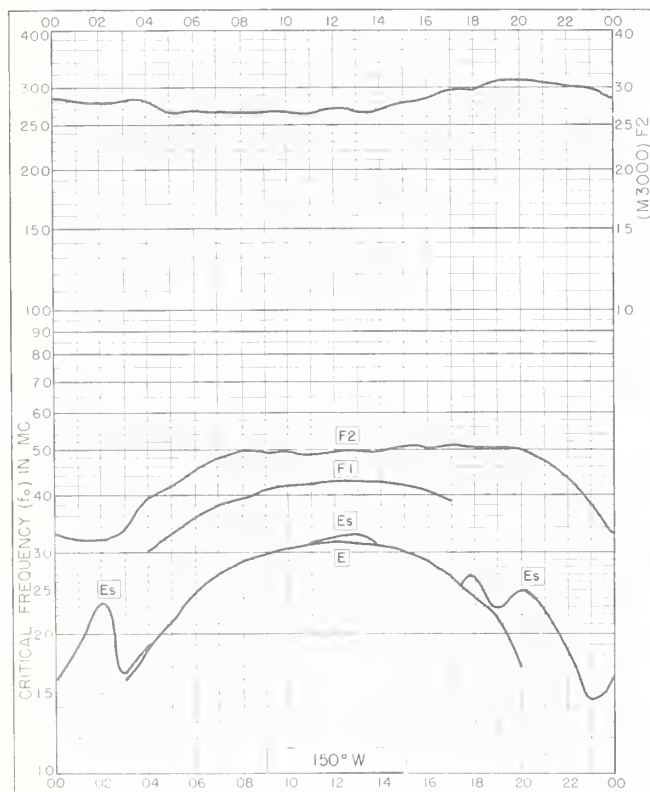


Fig. 3. ANCHORAGE, ALASKA  
61.2°N, 149.9°W

MAY 1961

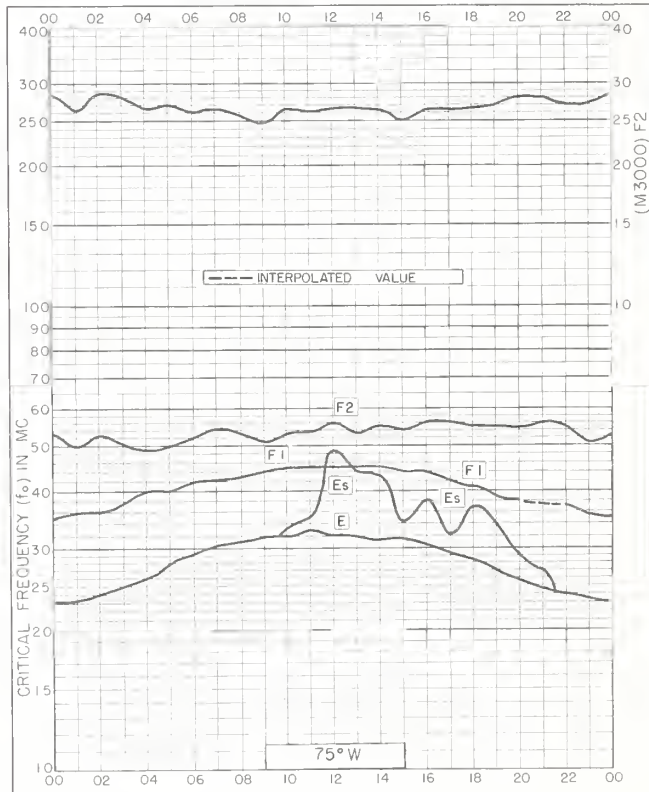


Fig. 4. THULE, GREENLAND  
76.6°N, 68.7°W

JUNE 1960

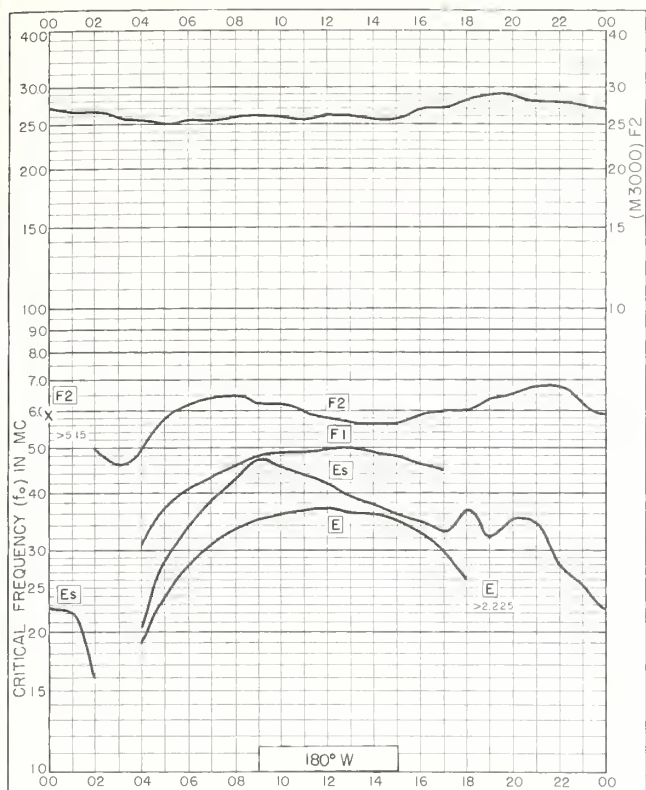


Fig. 5. ADAM, ALASKA  
51.9°N, 176.6°W

JUNE 1960

NBS 503

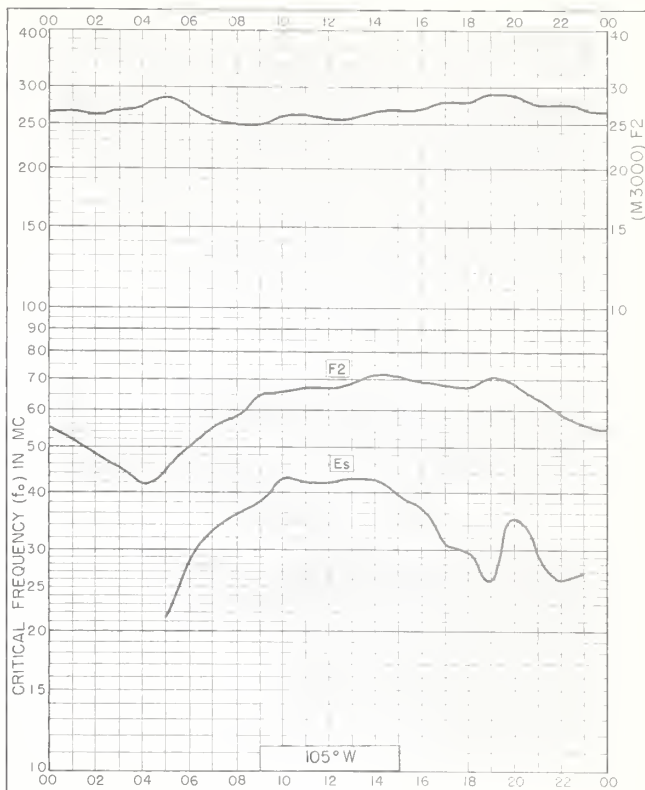


Fig. 6. BOULDER, COLORADO  
40.0°N, 105.3°W

JUNE 1960

NBS 503

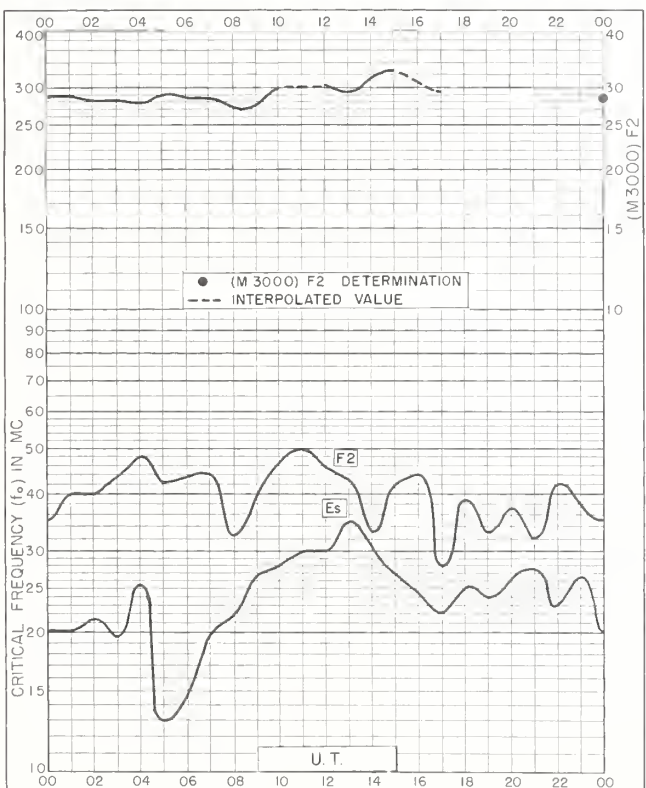


Fig. 7. POLE STATION  
90.0°S

JUNE 1960

NBS 503

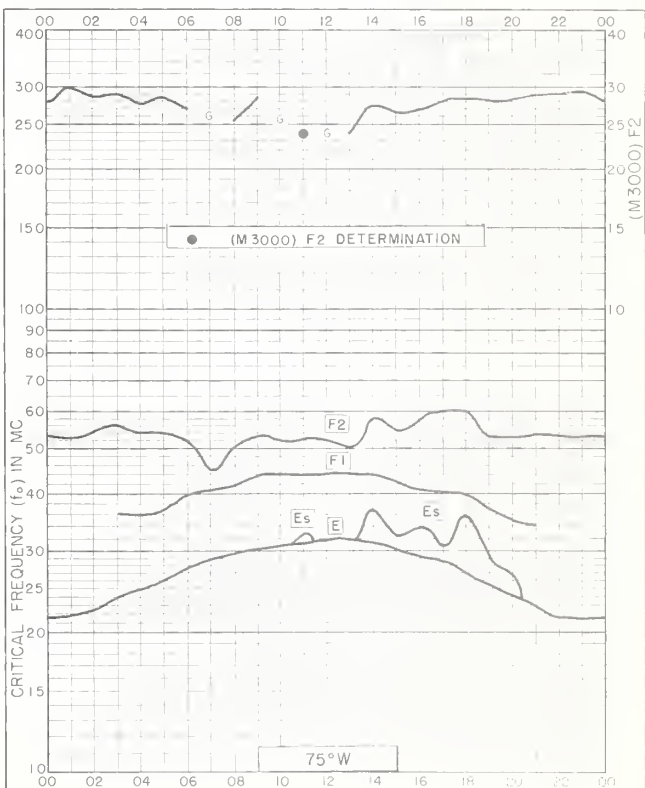


Fig. 8. THULE, GREENLAND  
76.6°N, 68.7°W

MAY 1960

NBS 503

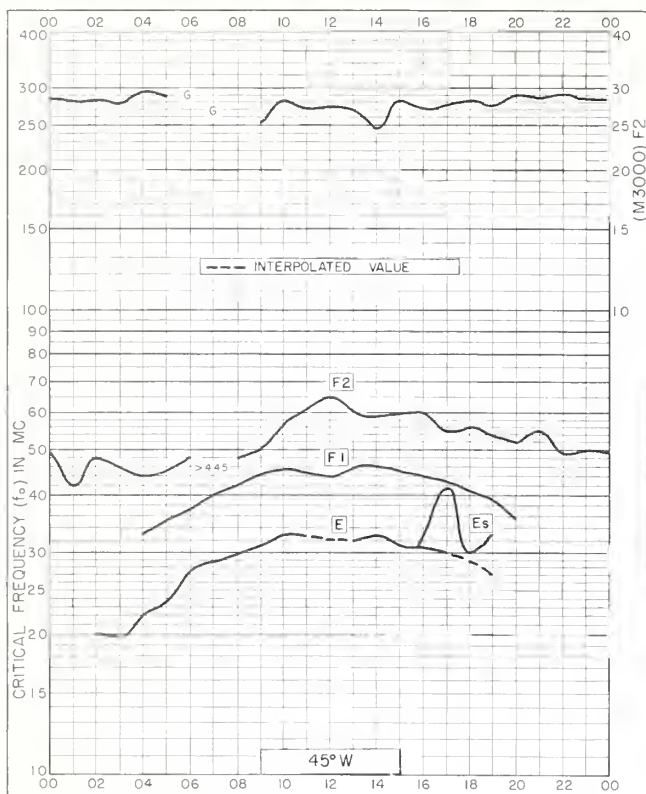


Fig. 9. GODHAVN, GREENLAND  
69.3°N, 53.5°W

MAY 1960

NBS 503



Fig. 10. FAIRBANKS, ALASKA  
64.9°N, 147.8°W

MAY 1960

NBS 503

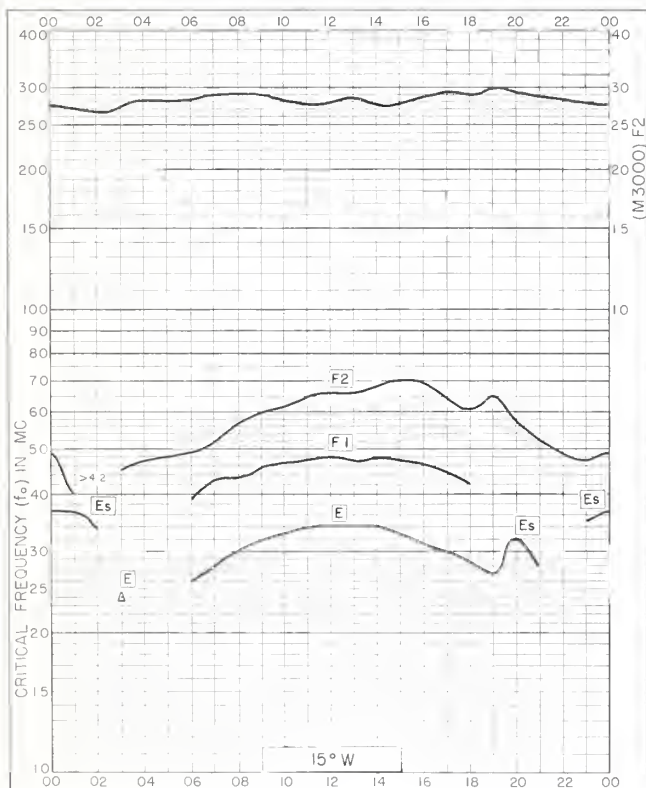


Fig. 11. REYKJAVIK, ICELAND  
64.1°N, 21.8°W

MAY 1960

NBS 503

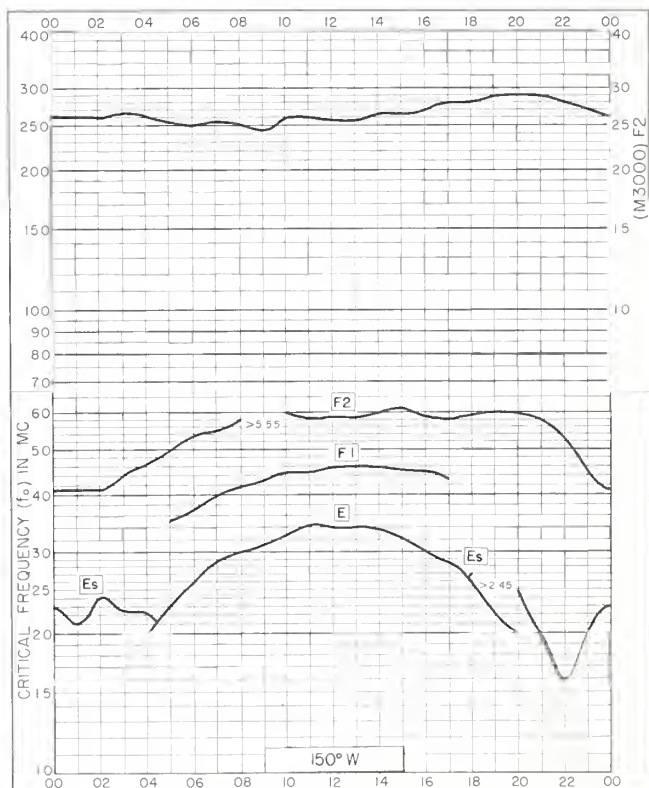


Fig. 12. ANCHORAGE, ALASKA  
61.2°N, 149.9°W

MAY 1960

NBS 503

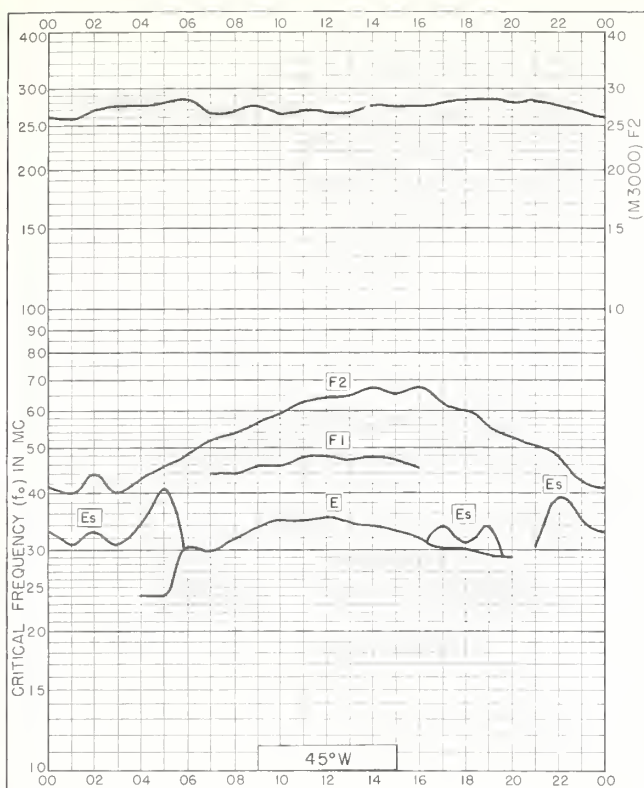


Fig. 13. NARSSARSSUAQ, GREENLAND  
61.2°N, 45.4°W MAY 1960

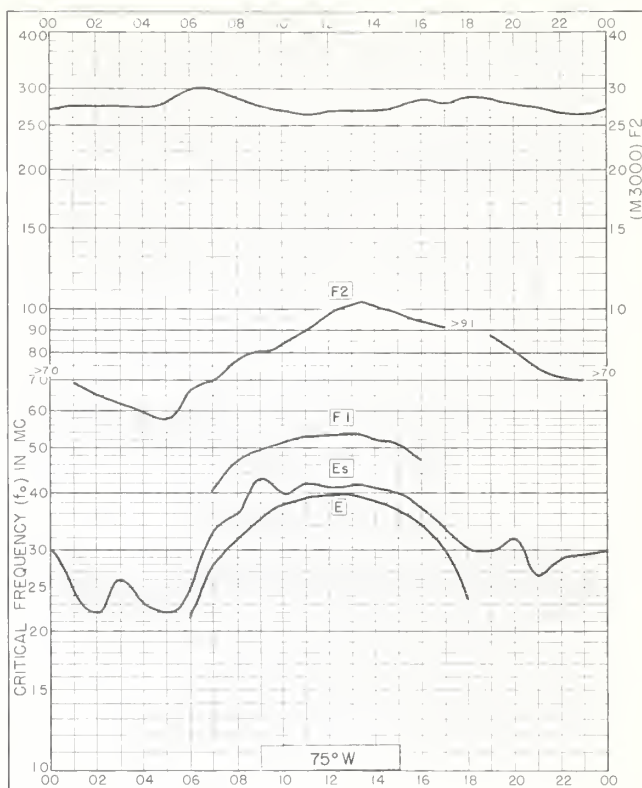


Fig. 14. GRAND BAHAMA I.  
26.6°N, 78.2°W MAY 1960

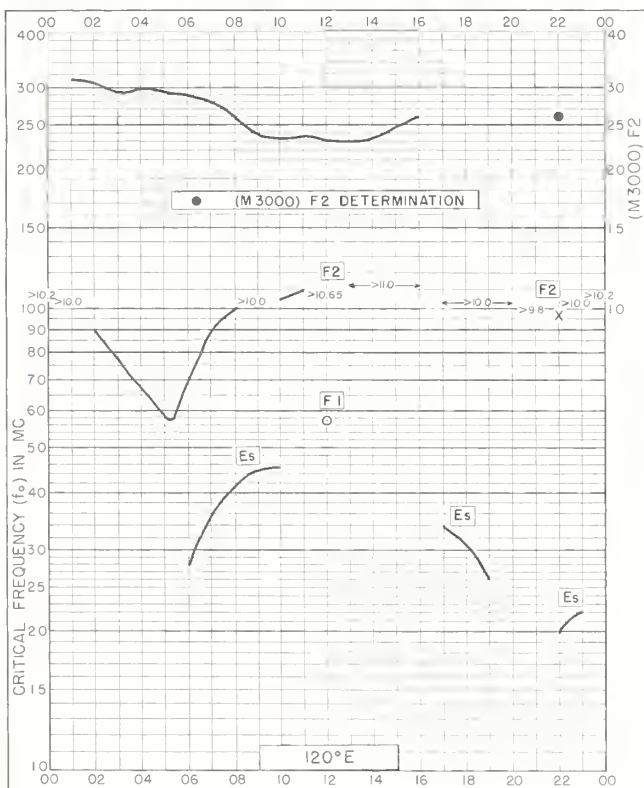


Fig. 15. BAGUIO, P. I.  
16.4°N, 120.6°E MAY 1960

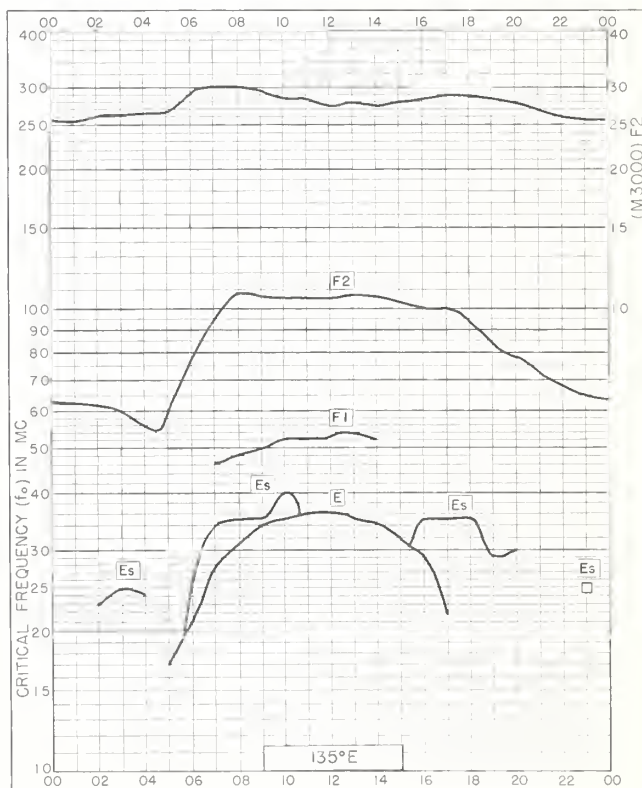


Fig. 16. WAKKANAI, JAPAN  
45.4°N, 141.7°E SEPTEMBER 1959



Fig. 17. AKITA, JAPAN  
39.7°N, 140.1°E SEPTEMBER 1959



Fig. 18. TOKYO, JAPAN  
35.7°N, 139.5°E SEPTEMBER 1959



Fig. 19. YAMAGAWA, JAPAN  
31.2°N, 130.6°E SEPTEMBER 1959

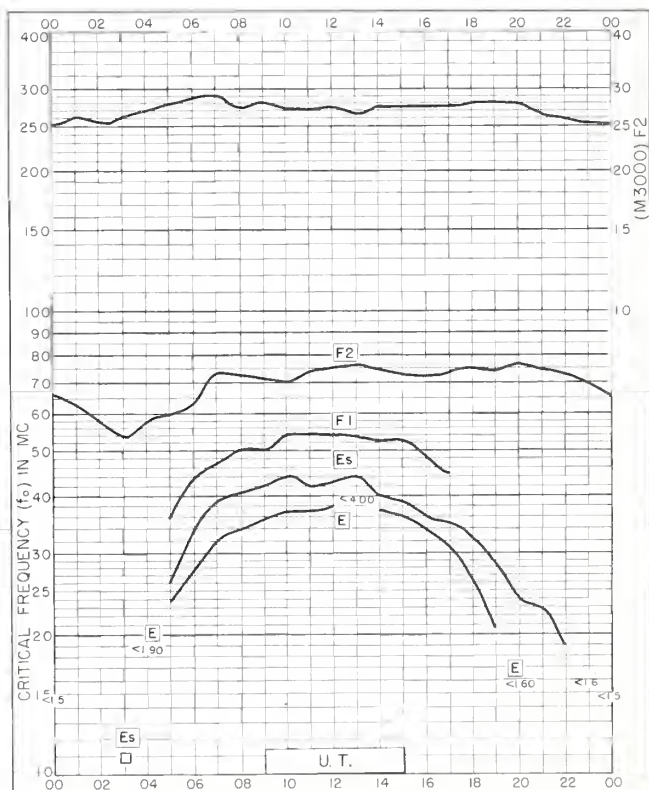


Fig. 20. DOORBES, BELGIUM  
50.1°N, 4.6°E JULY 1959

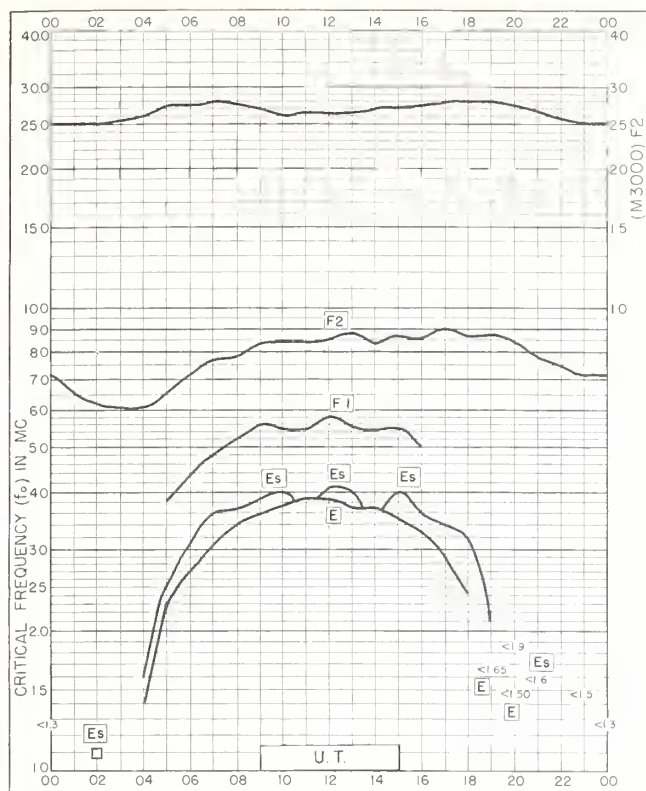


Fig. 21. DOURBES, BELGIUM  
50.1°N, 4.6°E

MAY 1959

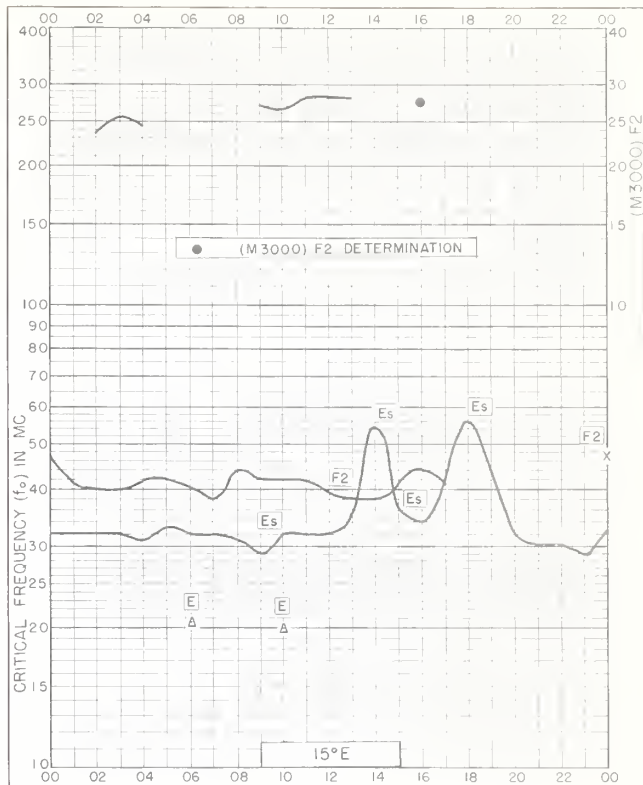


Fig. 22. SVALBARD, NORWAY  
78.2°N, 15.7°E

DECEMBER 1958

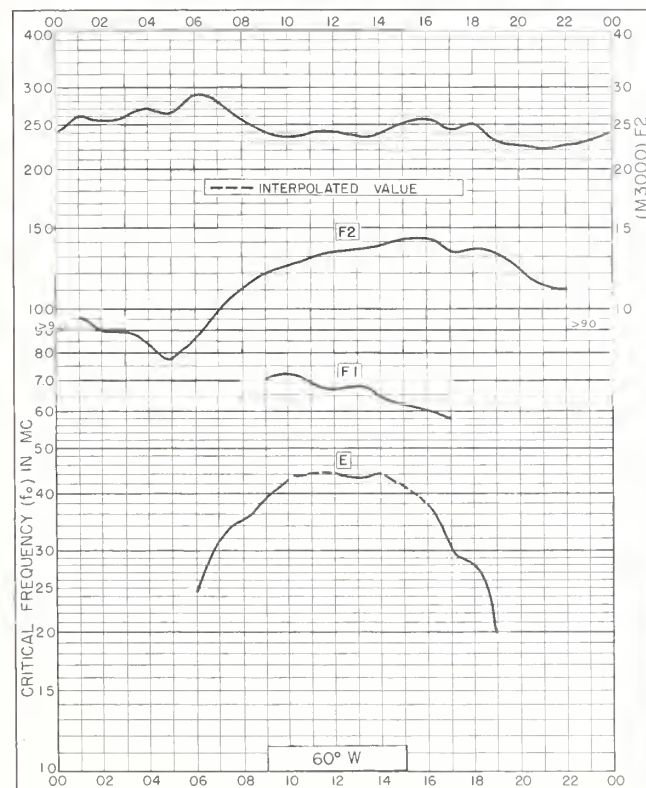


Fig. 23. TUCUMAN, ARGENTINA  
26.9°S, 65.4°W

DECEMBER 1958

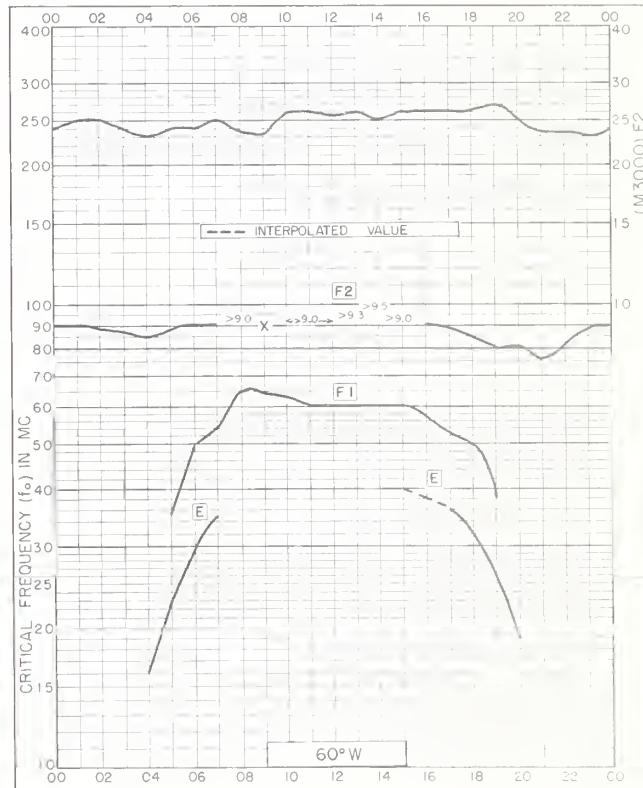


Fig. 24. TRELEW, ARGENTINA  
43.2°S, 65.3°W

DECEMBER 1958



Fig. 25. USHUAIA, ARGENTINA  
54.8°S, 68.3°W DECEMBER 1958



Fig. 26. TUCUMAN, ARGENTINA  
26.9°S, 65.4°W NOVEMBER 1958

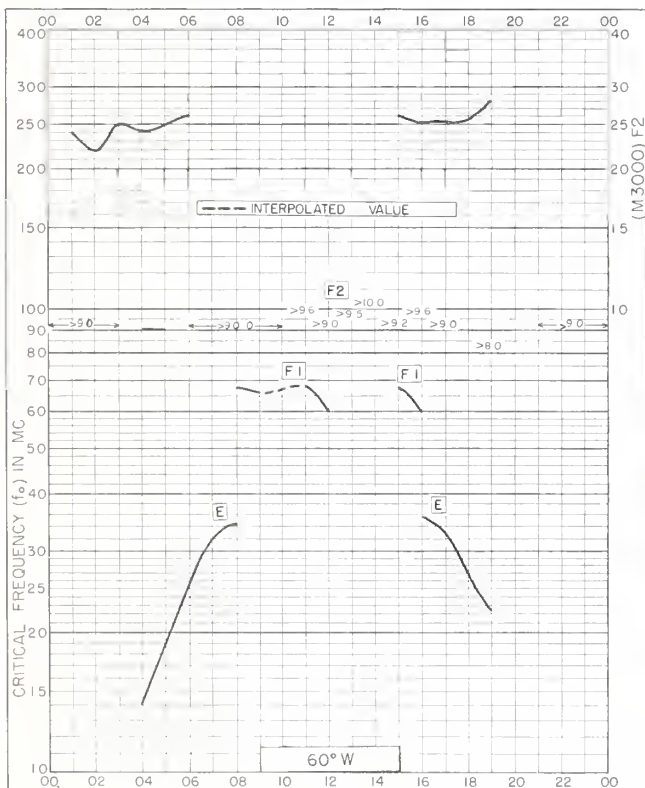


Fig. 27. TRELEW, ARGENTINA  
43.2°S, 65.3°W NOVEMBER 1958

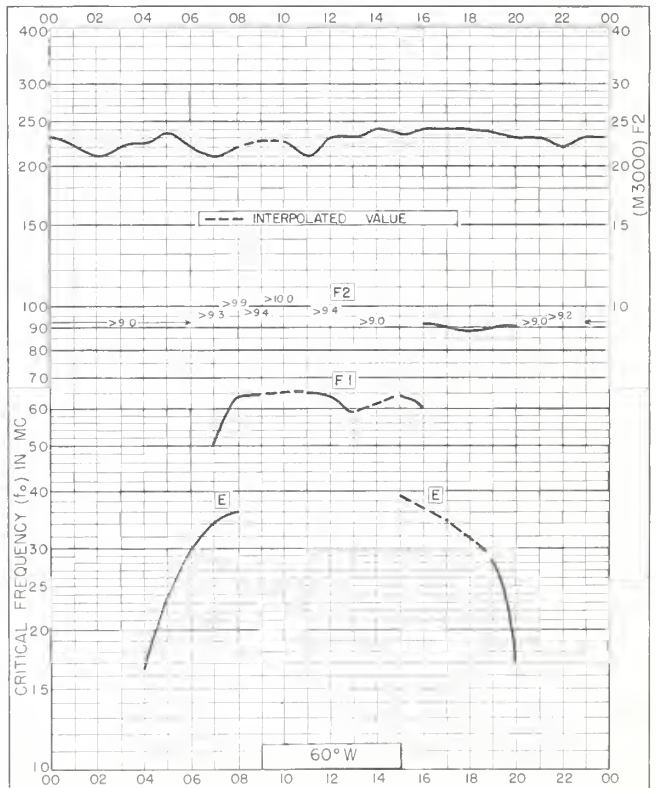


Fig. 28. USHUAIA, ARGENTINA  
54.8°S, 68.3°W NOVEMBER 1958

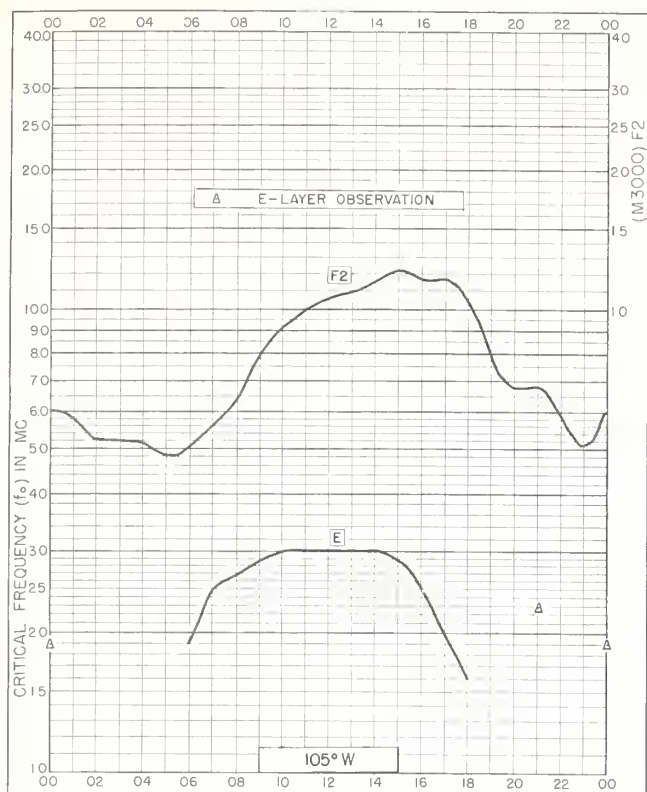


Fig. 29. YELLOWKNIFE, CANADA  
62.4°N, 114.4°W  
OCTOBER 1958

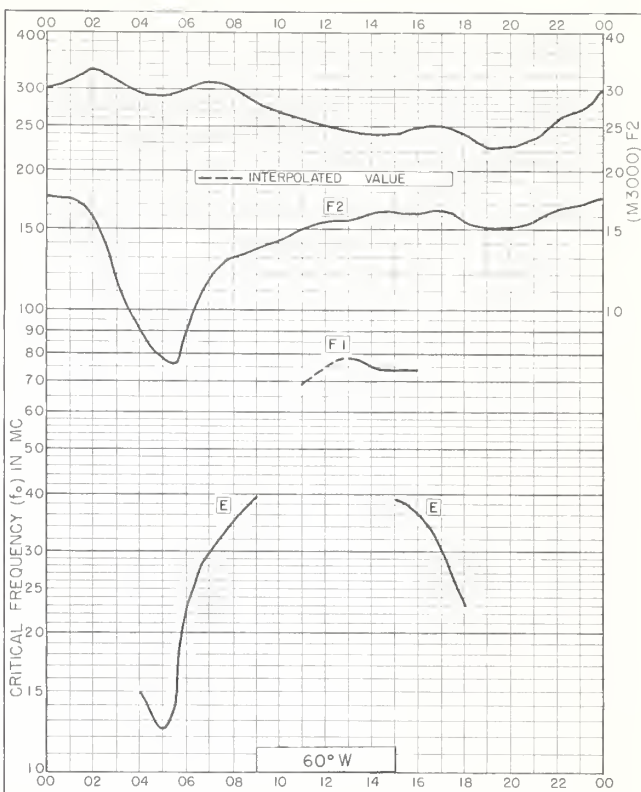


Fig. 30. TUCUMAN, ARGENTINA  
26.9°S, 65.4°W  
OCTOBER 1958

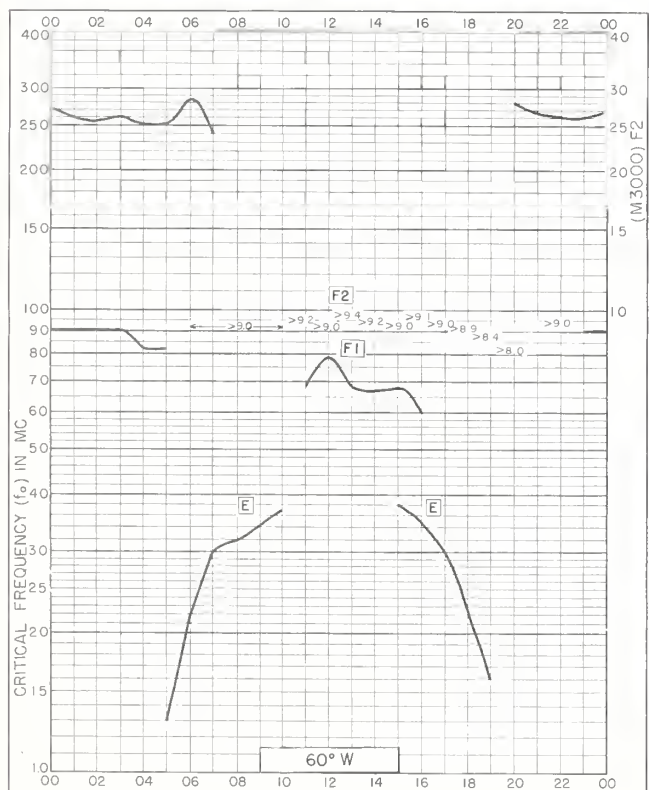


Fig. 31. TRELEW, ARGENTINA  
43.2°S, 65.3°W  
OCTOBER 1958

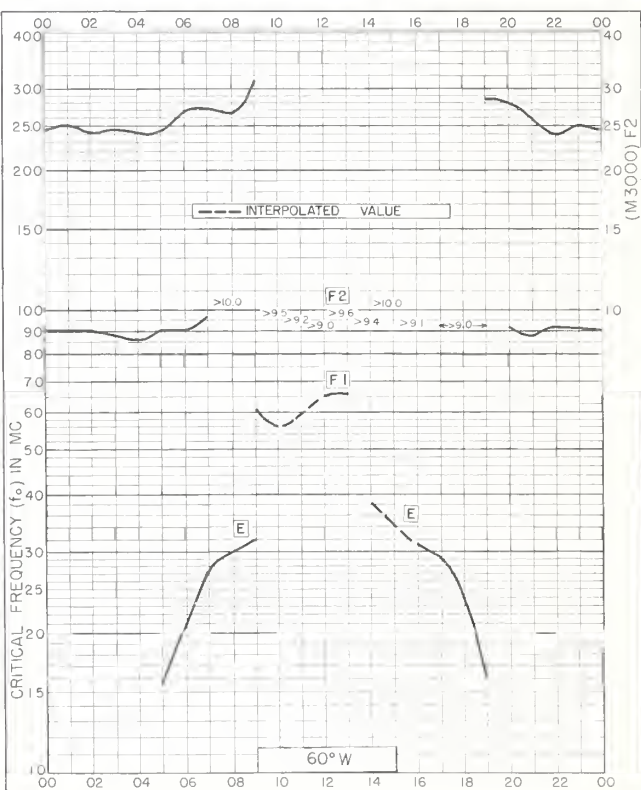
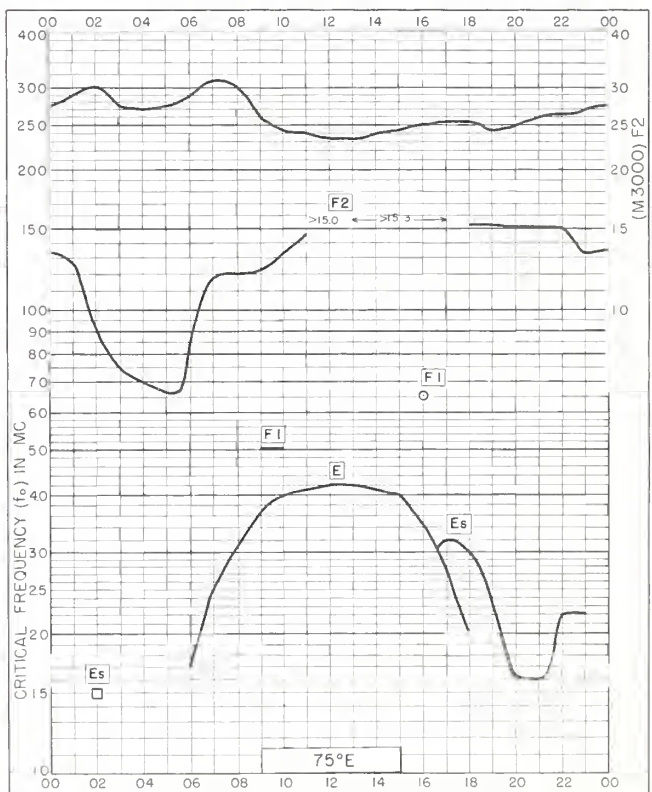
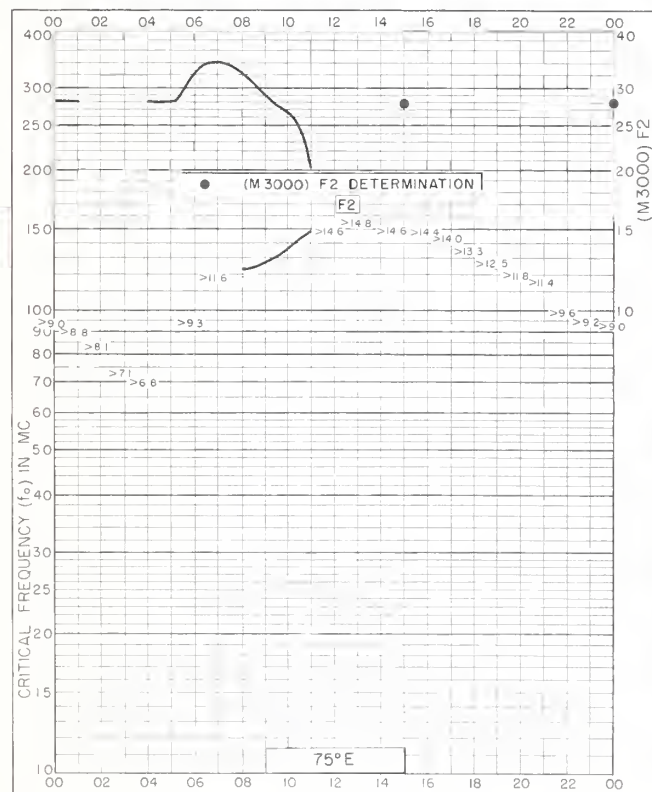
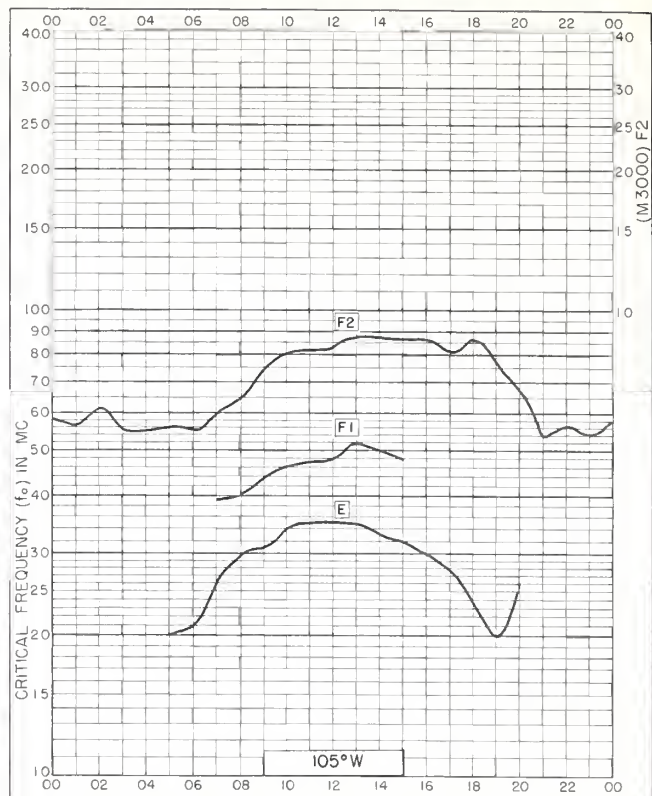


Fig. 32. USHUAIA, ARGENTINA  
54.8°S, 68.3°W  
OCTOBER 1958



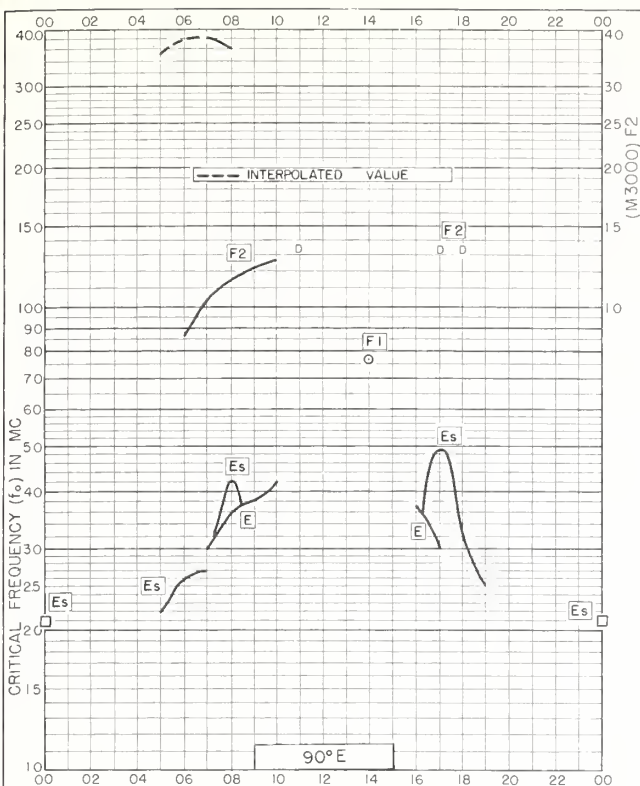


Fig. 37. CALCUTTA, INDIA  
23.0°N, 88.6°E SEPTEMBER 1958

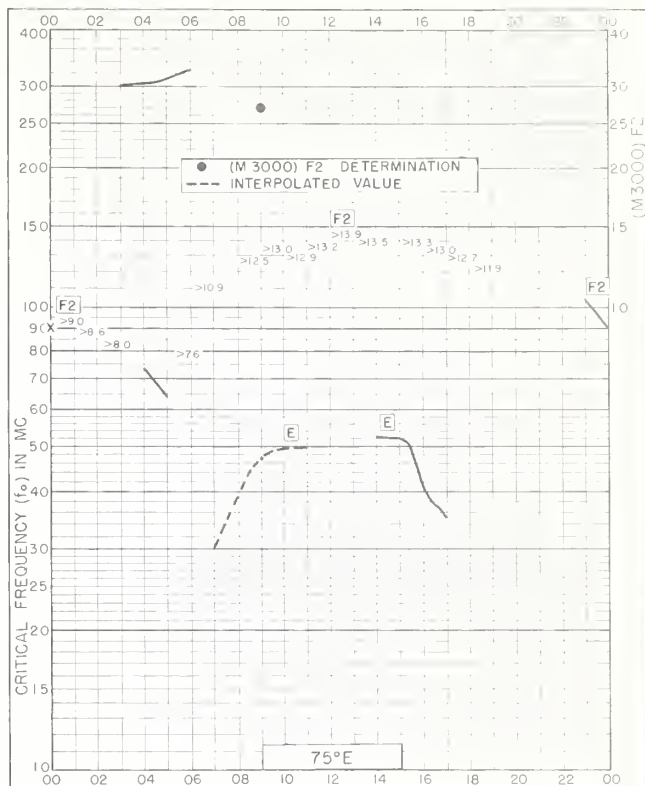


Fig. 38. BOMBAY, INDIA  
19.0°N, 72.8°E SEPTEMBER 1958

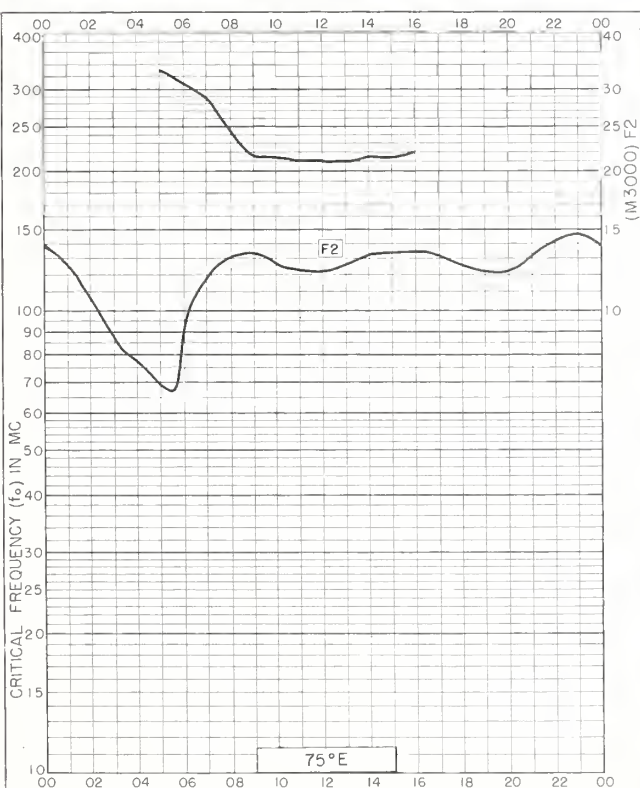


Fig. 39. MADRAS, INDIA  
13.1°N, 80.3°E SEPTEMBER 1958

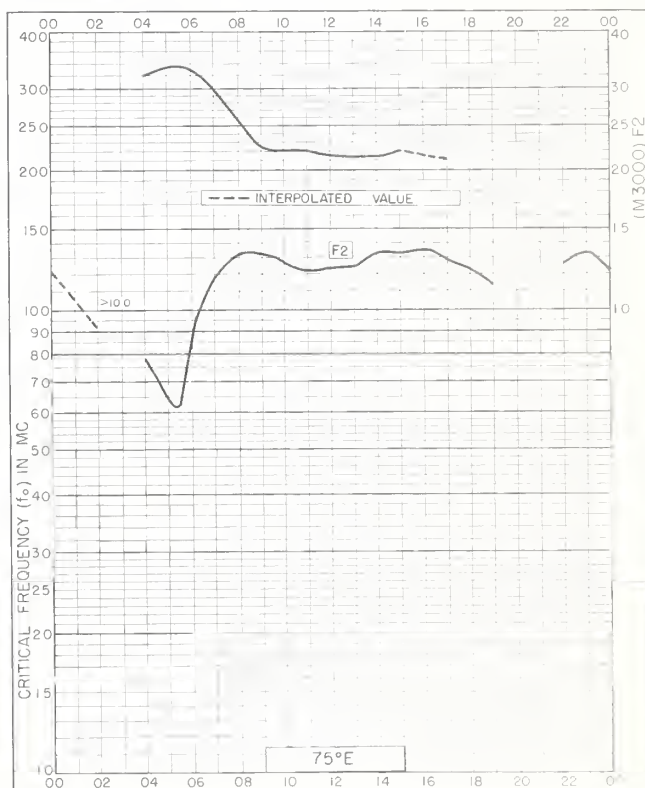


Fig. 40. TIRUCHY, INDIA  
10.8°N, 78.7°E SEPTEMBER 1958

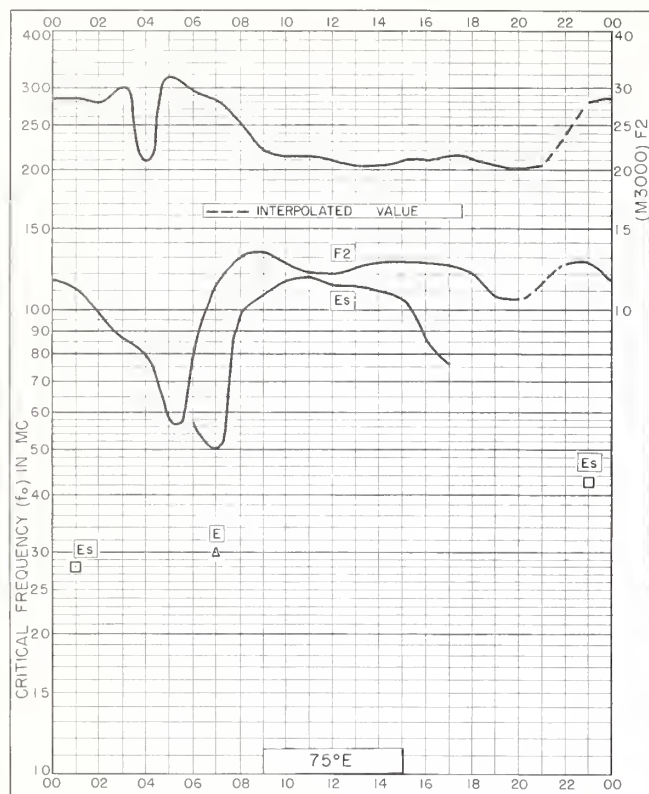


Fig. 41. KODAIKANAL, INDIA  
10.2°N, 77.5°E SEPTEMBER 1958

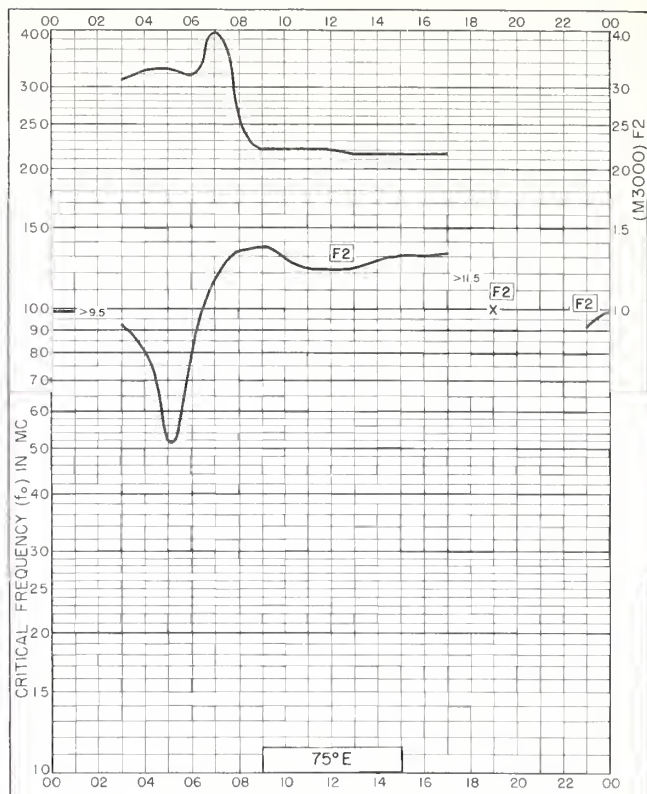


Fig. 42. TRIVANDRUM, INDIA  
8 5°N, 77.0°E SEPTEMBER 1958

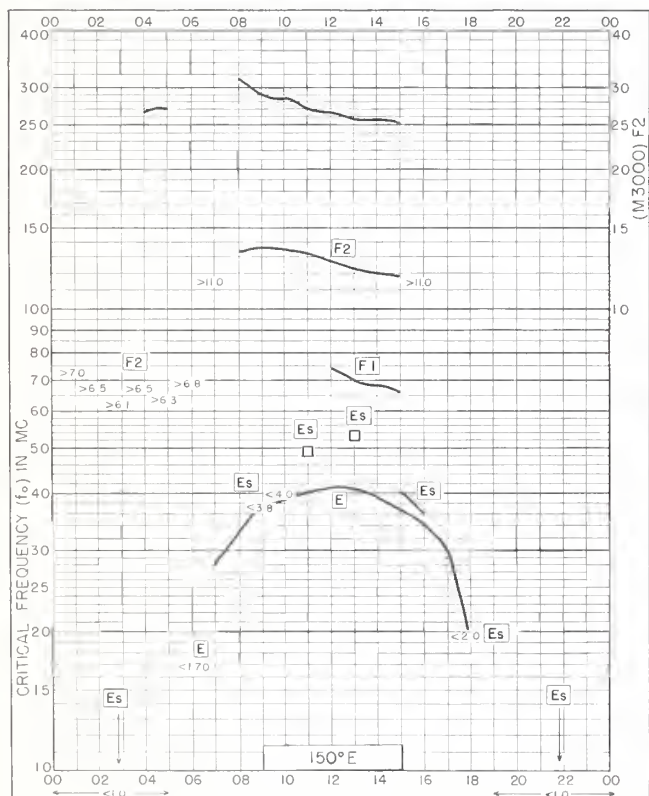


Fig. 43. TOWNSVILLE, AUSTRALIA  
19.3°S, 146.7°E SEPTEMBER 1958

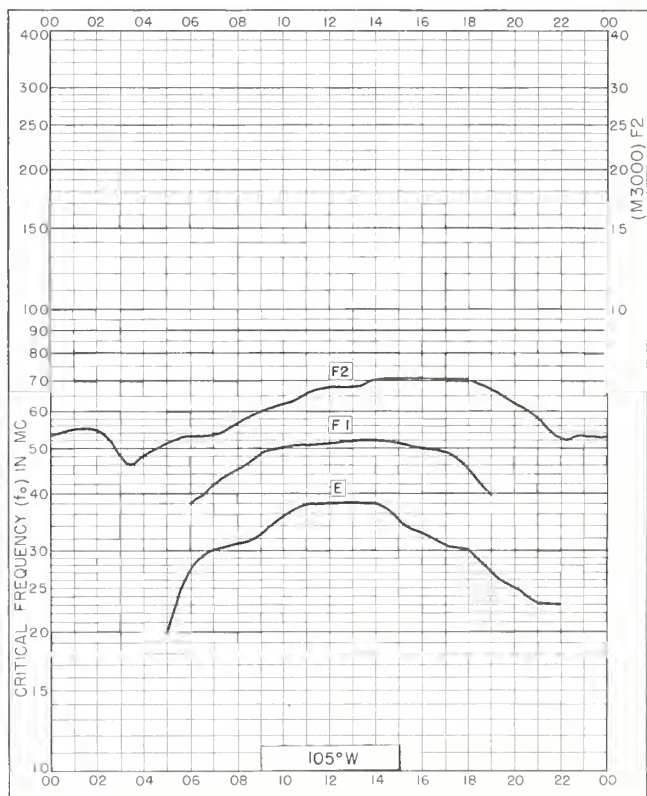


Fig. 44. YELLOWKNIFE, CANADA  
62.4°N, 114.4°W AUGUST 1958

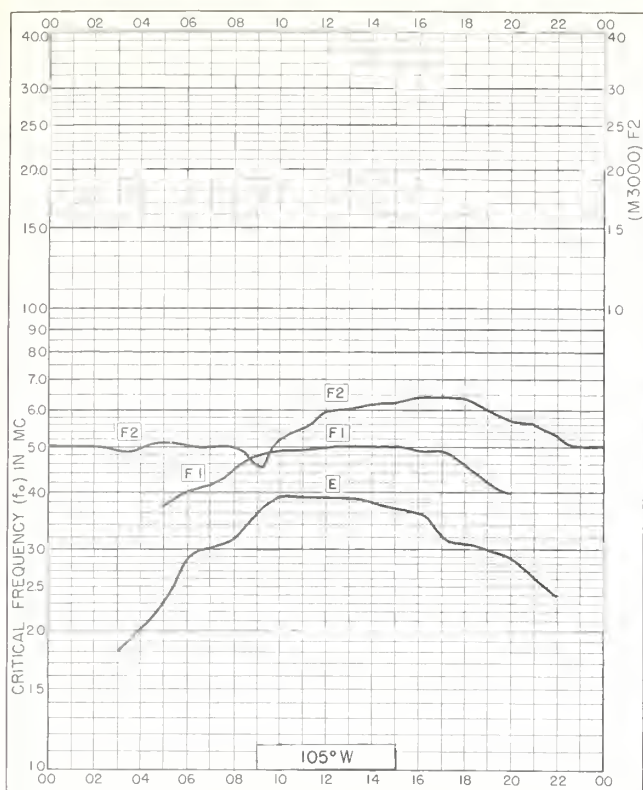


Fig. 45. YELLOWKNIFE, CANADA  
62.4°N, 114.4°W

JULY 1958

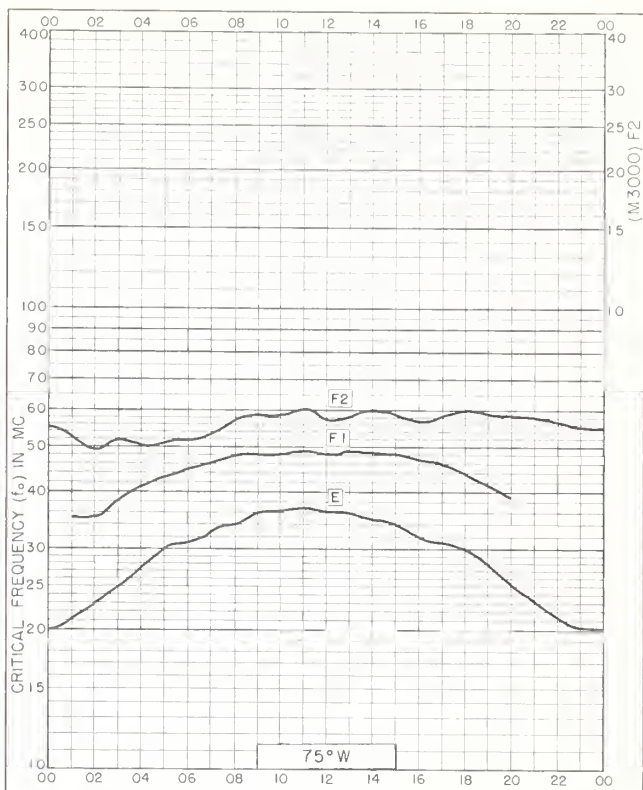


Fig. 46. CLYDE, BAFFIN I.  
70.5°N, 68.6°W

JUNE 1958

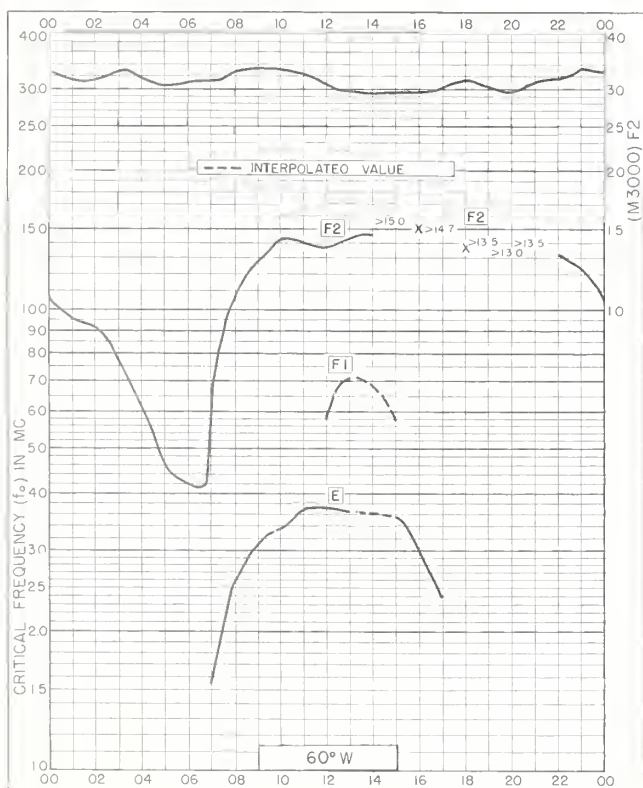


Fig. 47. TUCUMAN, ARGENTINA  
26.9°S, 65.4°W

JUNE 1958

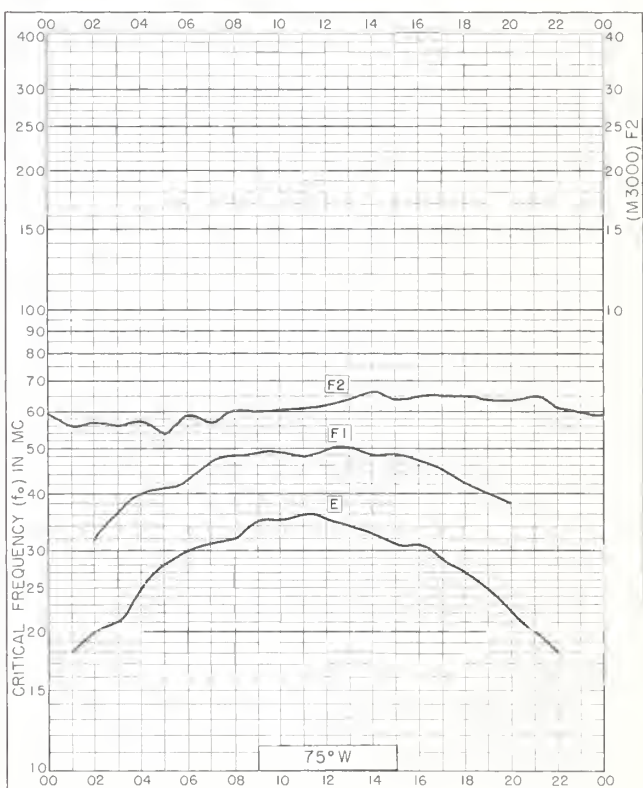


Fig. 48. CLYDE, BAFFIN I.  
70.5°N, 68.6°W

MAY 1958

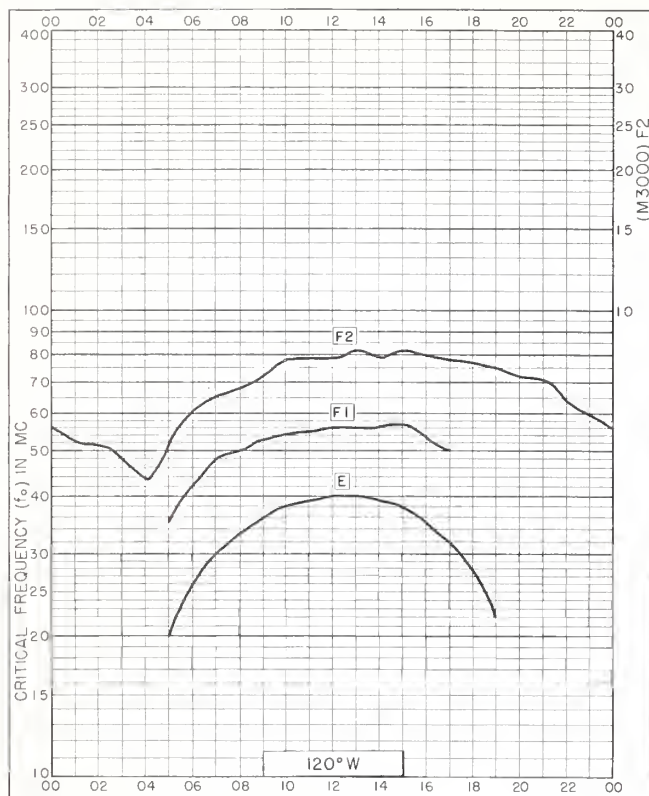


Fig. 49. VICTORIA, CANADA  
48.4°N, 123.4°W

MAY 1958

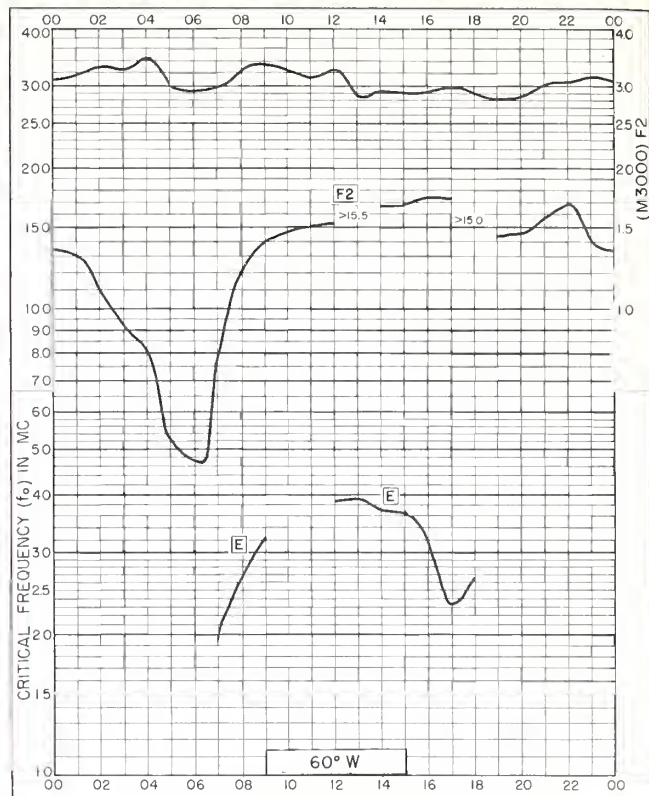


Fig. 50. TUCUMAN, ARGENTINA  
26.9°S, 65.4°W

MAY 1958

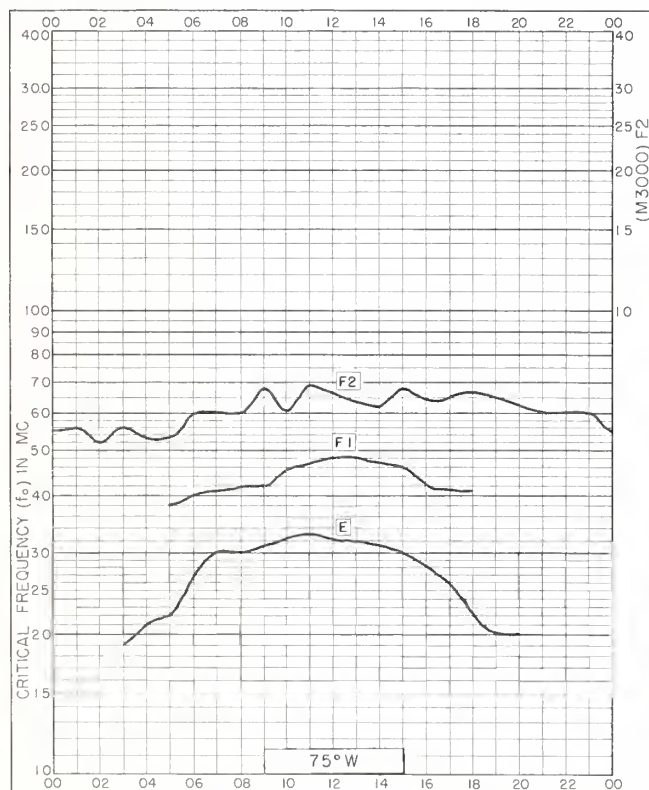


Fig. 51. CLYDE, BAFFIN I.  
70.5°N, 68.6°W

APRIL 1958

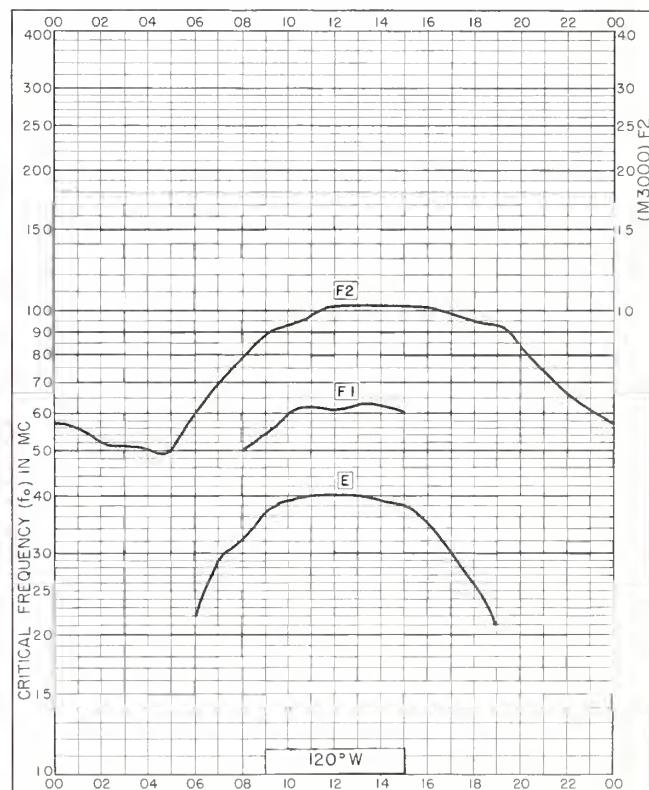


Fig. 52. VICTORIA, CANADA  
48.4°N, 123.4°W

APRIL 1958

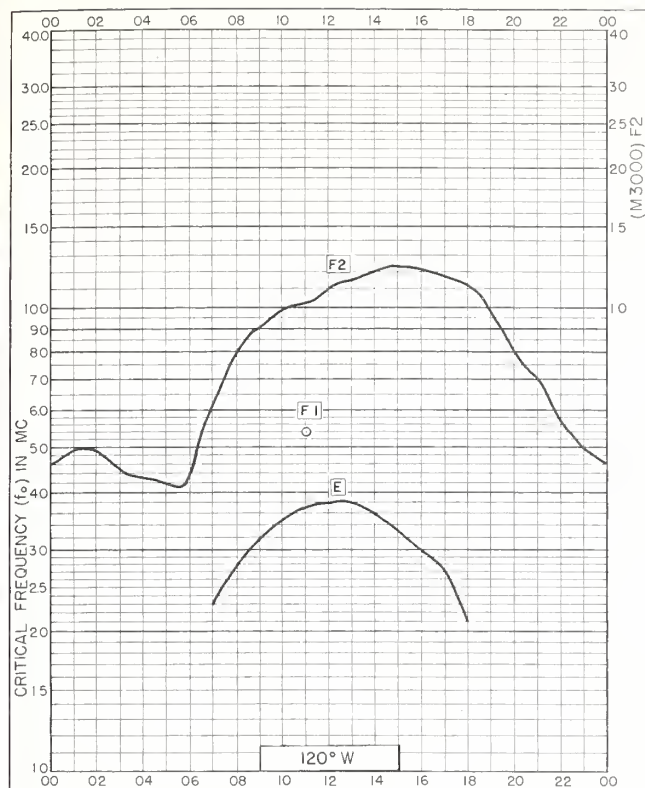


Fig. 53. VICTORIA, CANADA  
48.4°N, 123.4°W

MARCH 1958

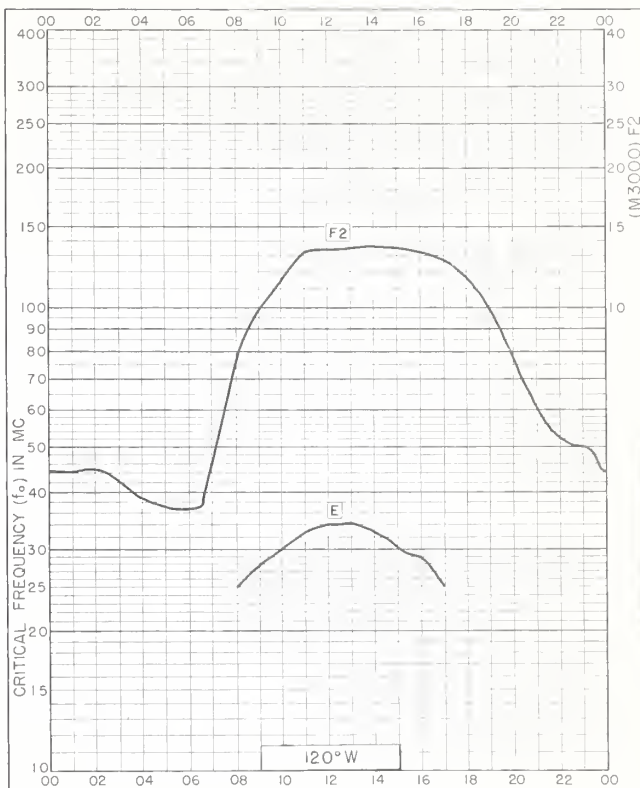


Fig. 54. VICTORIA, CANADA  
48.4°N, 123.4°W

FEBRUARY 1958

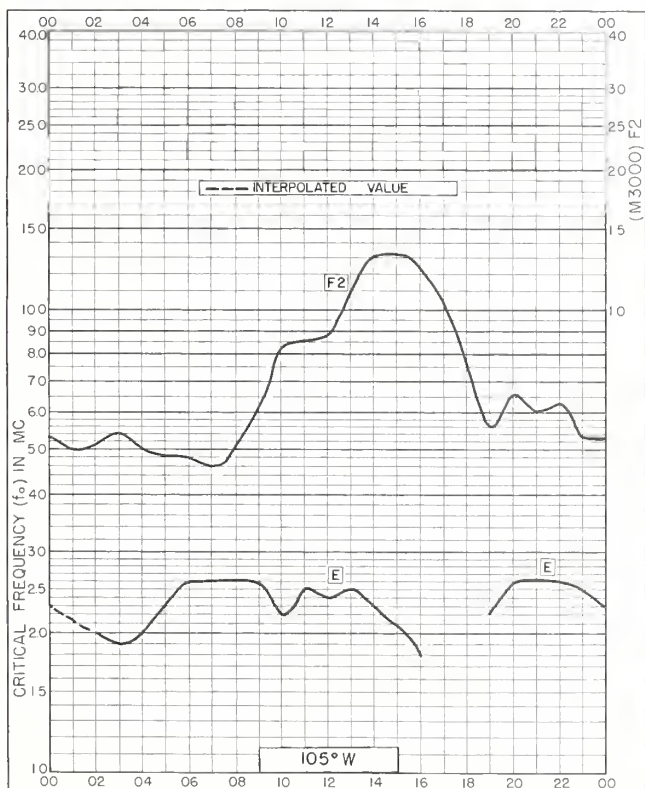


Fig. 55. YELLOWKNIFE, CANADA  
62.4°N, 114.4°W

DECEMBER 1957

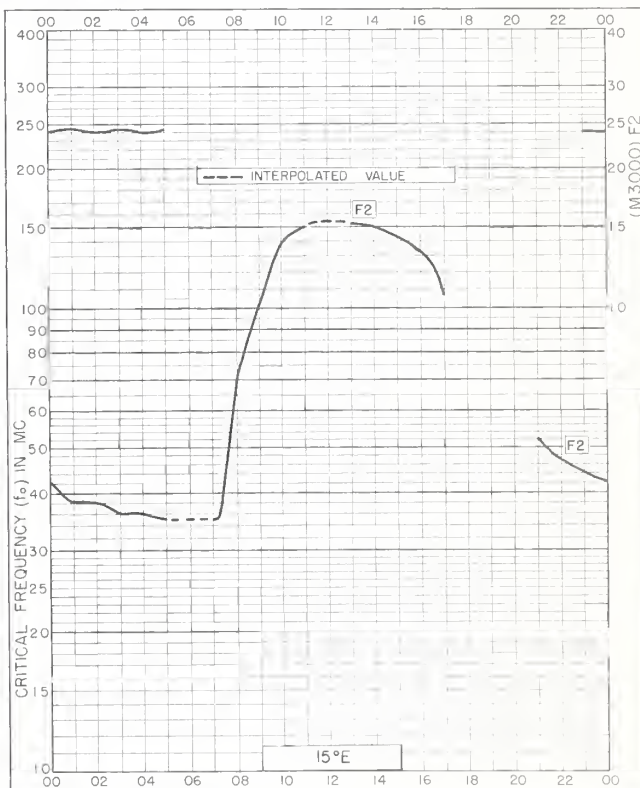


Fig. 56. JULIUSRUH/RÜGEN, GERMANY  
54.6°N, 13.4°E

DECEMBER 1957



Fig. 57. HOLLANDIA, NETHERLANDS NEW GUINEA  
2.5°S, 140.8°E DECEMBER 1957

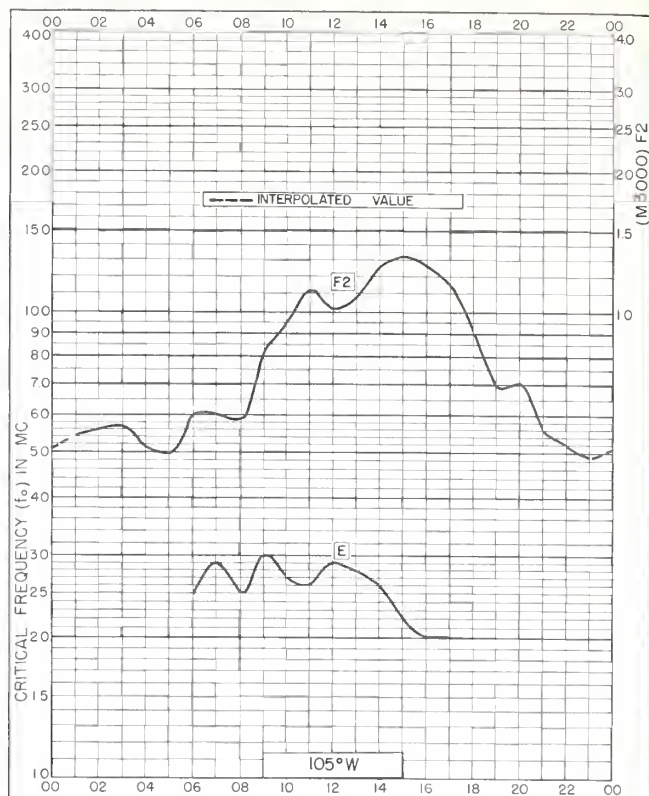


Fig. 58. YELLOWKNIFE, CANADA  
62.4°N, 114.4°W NOVEMBER 1957

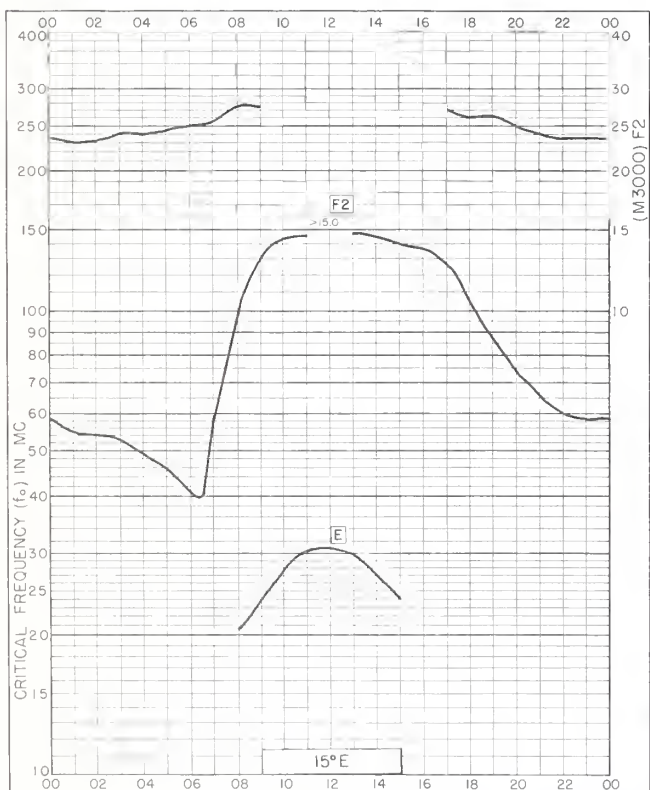


Fig. 59. JULIUSRUH/RÜGEN, GERMANY  
54.6°N, 13.4°E NOVEMBER 1957

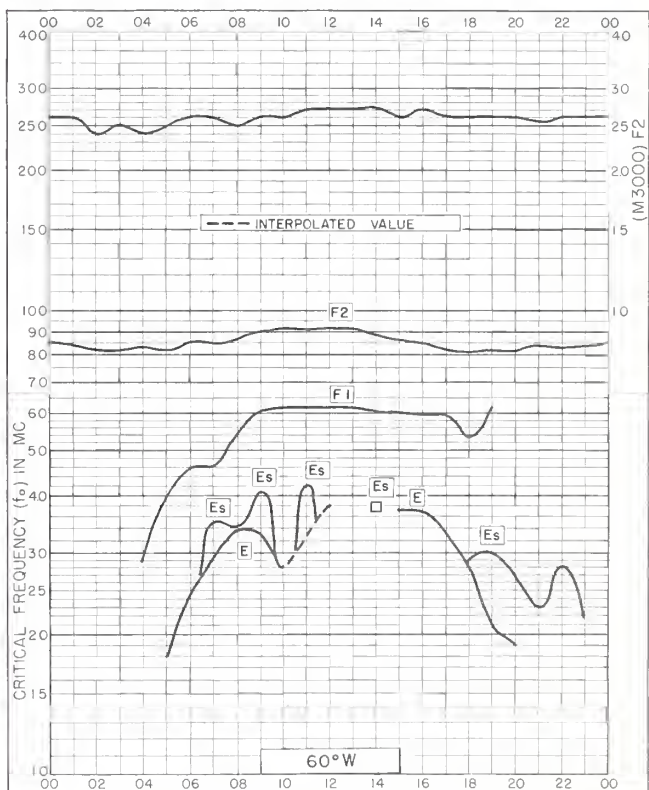


Fig. 60. USHUAIA, ARGENTINA  
54.8°S, 68.3°W NOVEMBER 1957

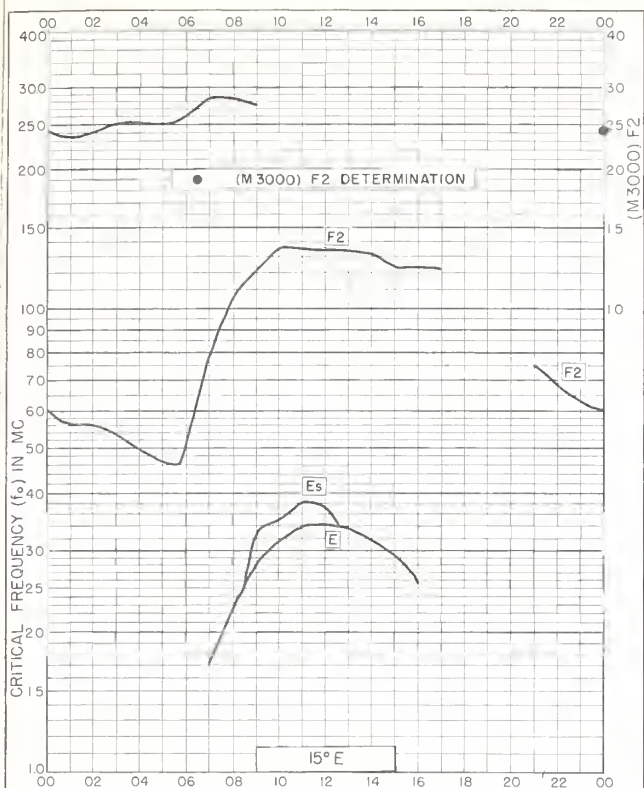


Fig. 61. JULIUSRUH/RÜGEN, GERMANY  
54.6°N, 13.4°E OCTOBER 1957

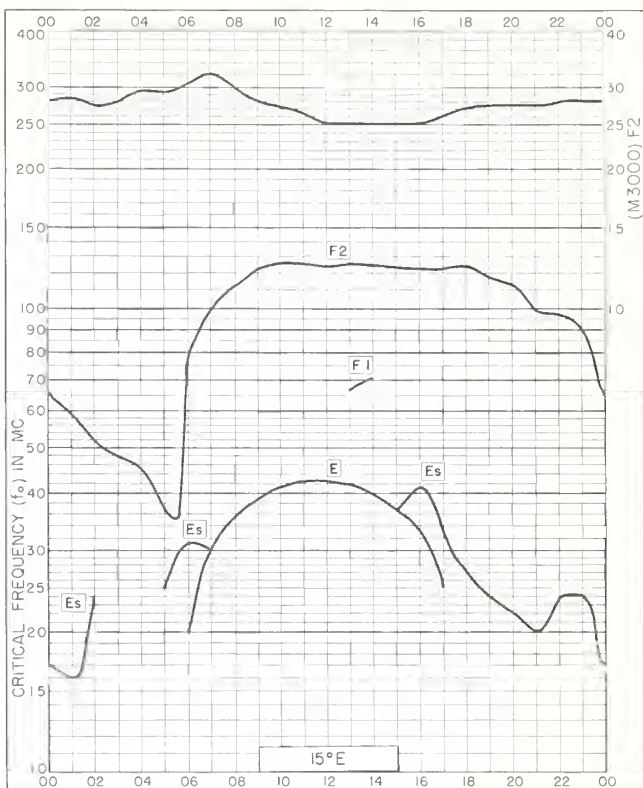


Fig. 62. TSUMEB, SOUTH W. AFRICA  
19.2°S, 17.7°E SEPTEMBER 1957

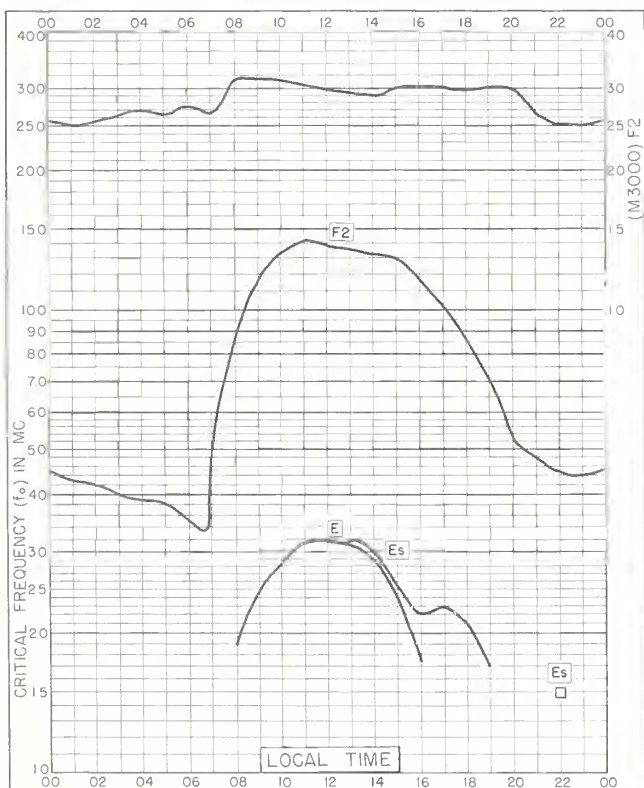


Fig. 63. FREIBURG, GERMANY  
48.1°N, 7.8°E DECEMBER 1956

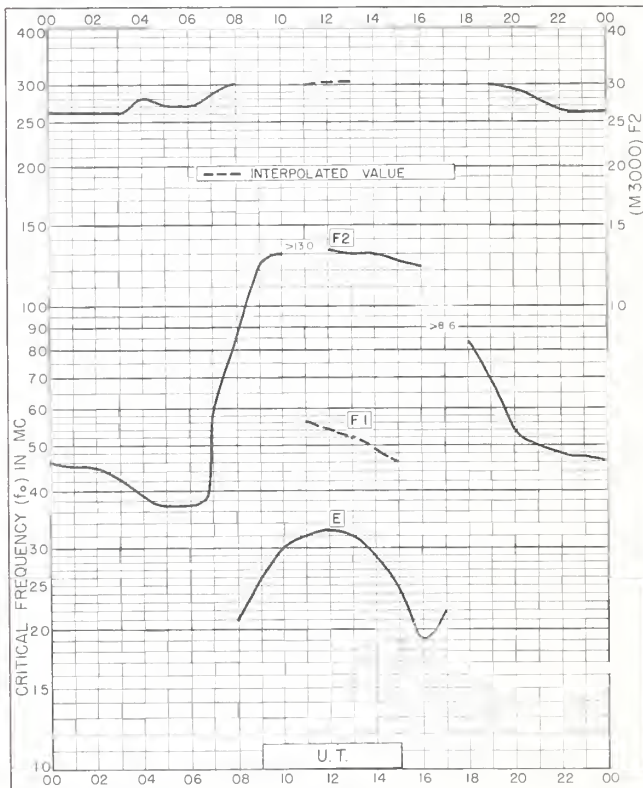


Fig. 64. POITIERS, FRANCE  
46.6°N, 0.3°E DECEMBER 1956

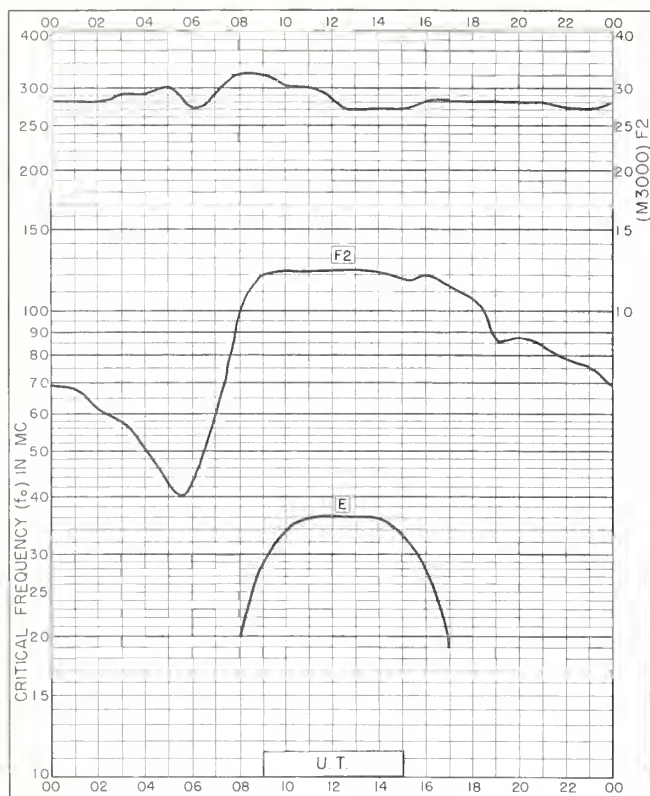


Fig. 65. CASABLANCA, MOROCCO  
33.6°N, 7.6°W  
DECEMBER 1956

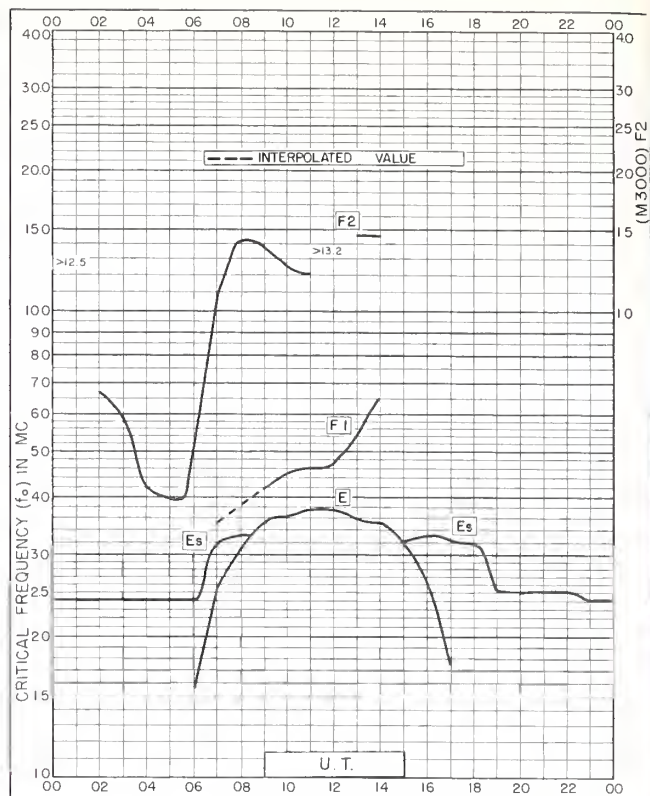


Fig. 66. TAMANRASSET, FRENCH W. AFRICA  
22.8°N, 5.5°E  
DECEMBER 1956

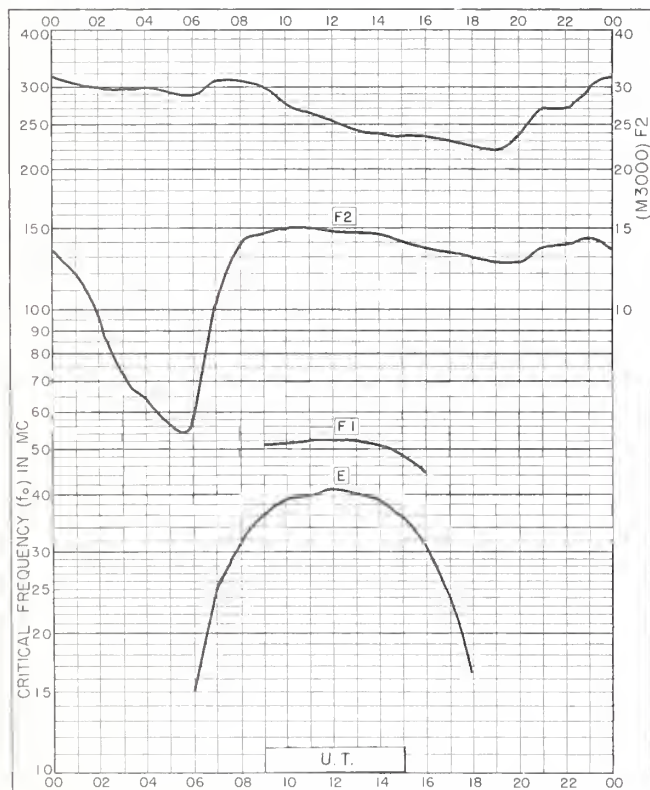


Fig. 67. DAKAR, FRENCH W. AFRICA  
14.8°N, 17.4°W  
DECEMBER 1956

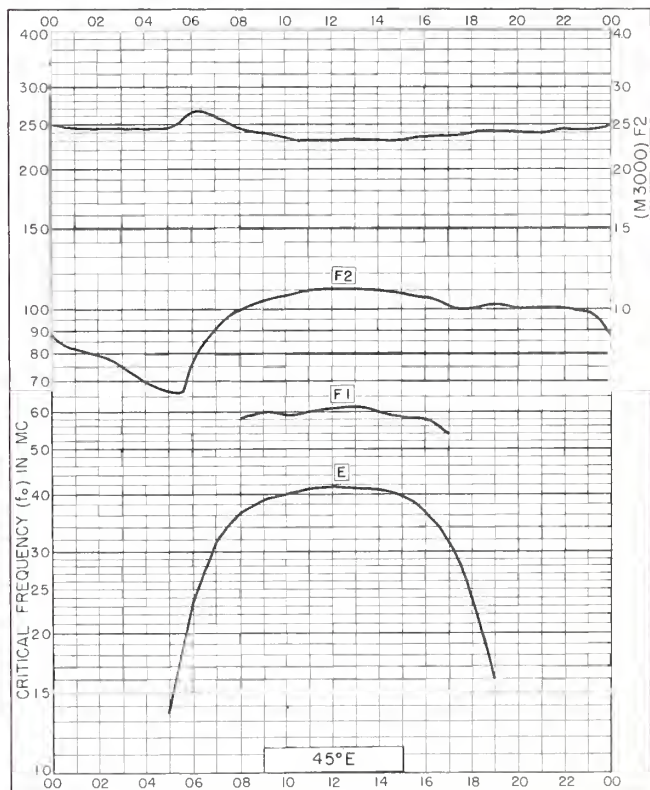


Fig. 68. TANANARIVE, MADAGASCAR  
18.8°S, 47.5°E  
DECEMBER 1956

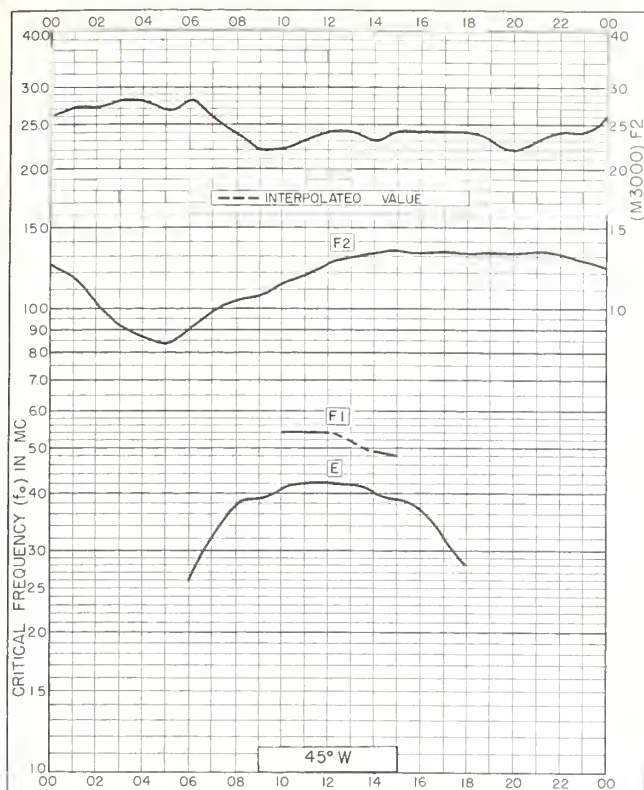


Fig. 69. SAO PAULO, BRAZIL

23.5°S, 46.5°W

DECEMBER 1956

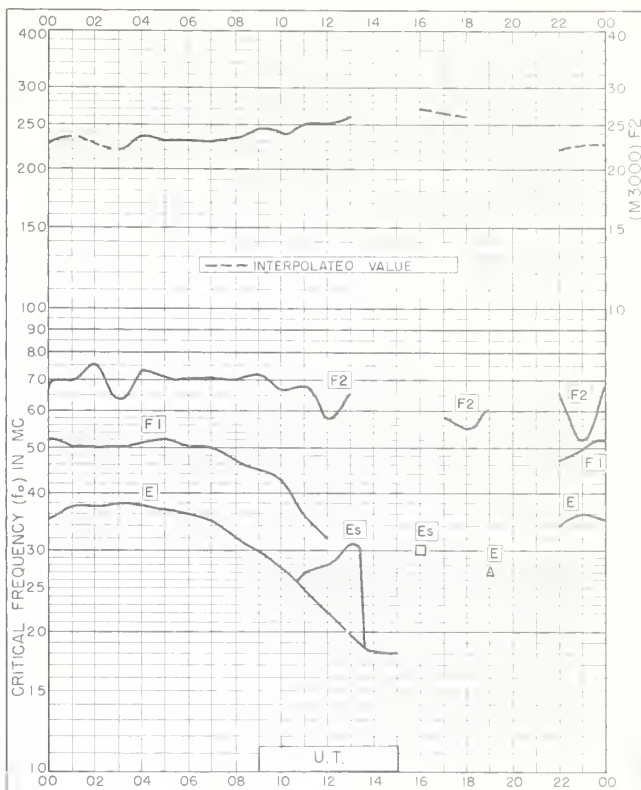


Fig. 70. TERRE ADELIE

66.7°S, 140.0°E

DECEMBER 1956

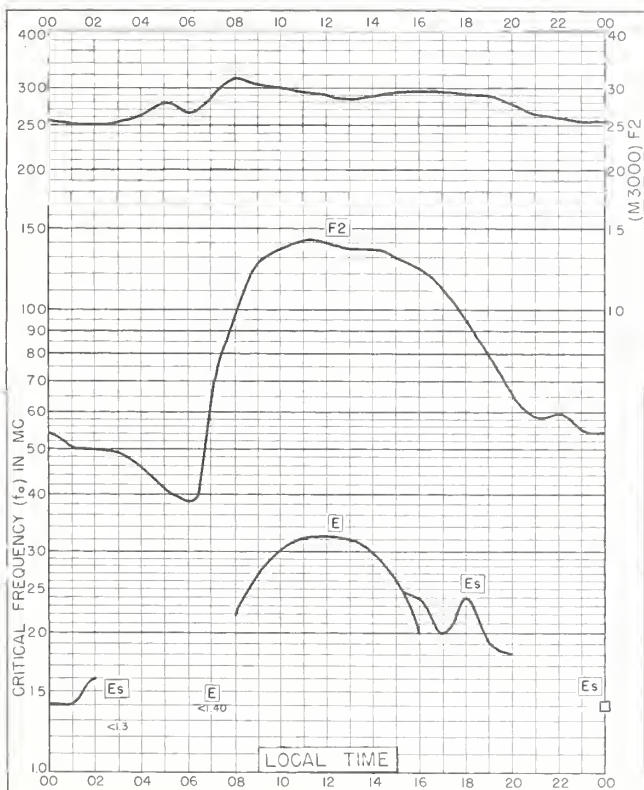


Fig. 71. FREIBURG, GERMANY

48.1°N, 7.8°E

NOVEMBER 1956

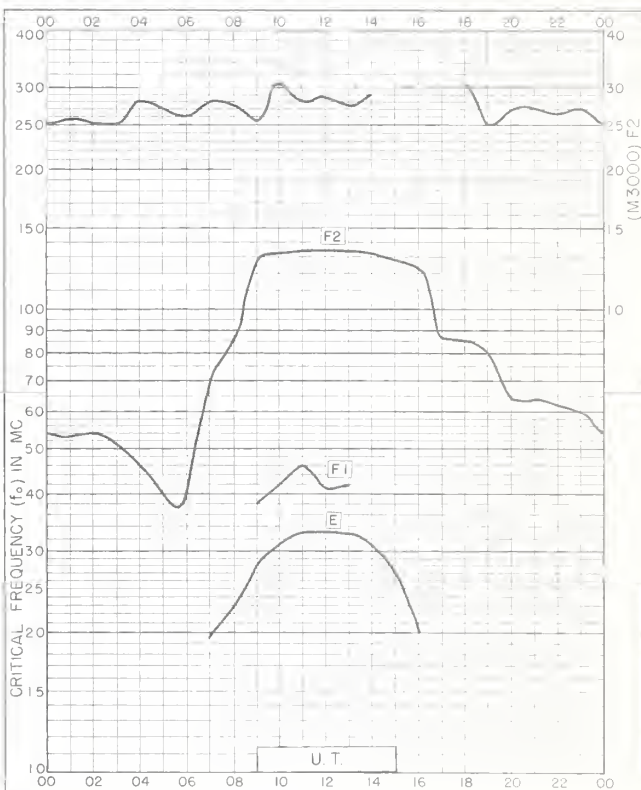


Fig. 72. POITIERS, FRANCE

46.6°N, 0.3°E

NOVEMBER 1956

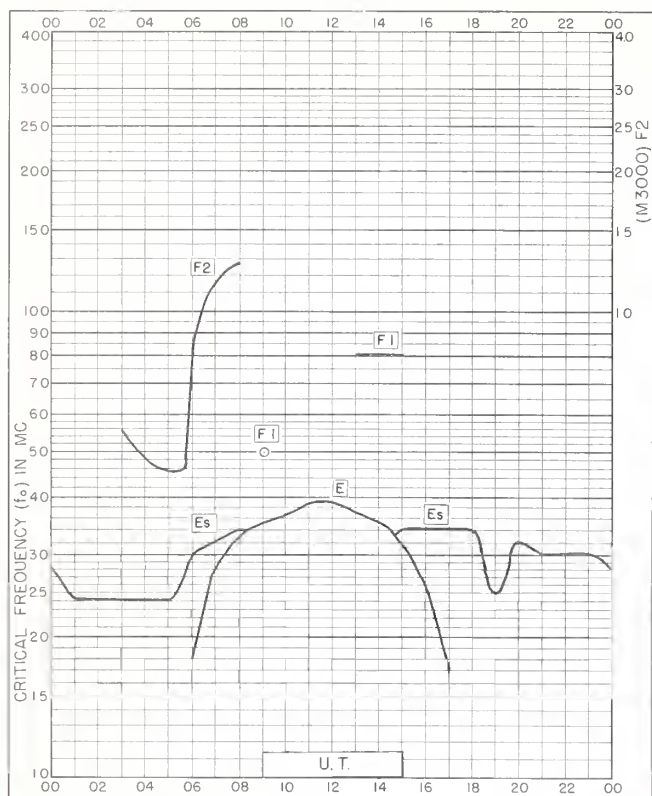


Fig. 73. TAMANRASSET, FRENCH W. AFRICA  
22.8°N, 5.5°E NOVEMBER 1956



Fig. 74. DAKAR, FRENCH W. AFRICA  
14°N, 17.4°W NOVEMBER 1956

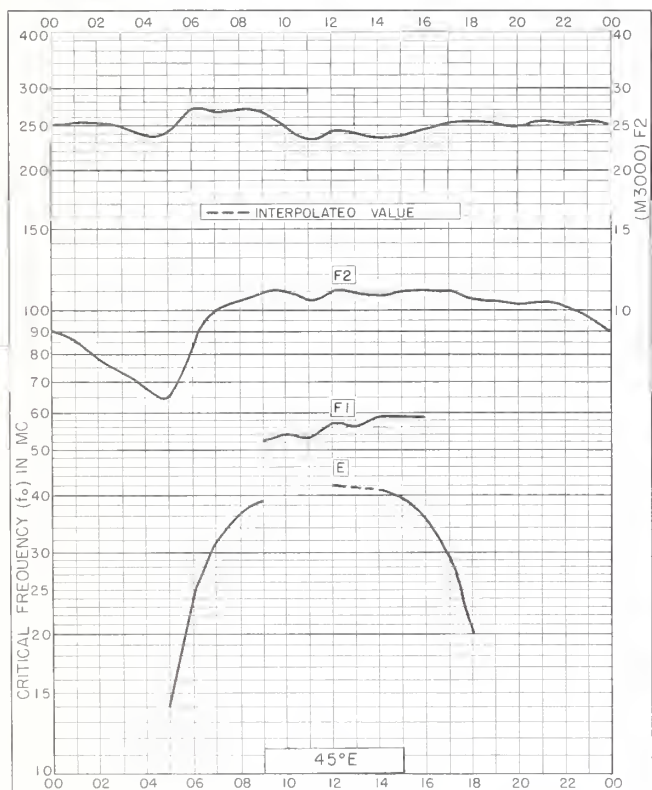


Fig. 75. TANANARIVE, MADAGASCAR  
18.8°S, 47.5°E NOVEMBER 1956

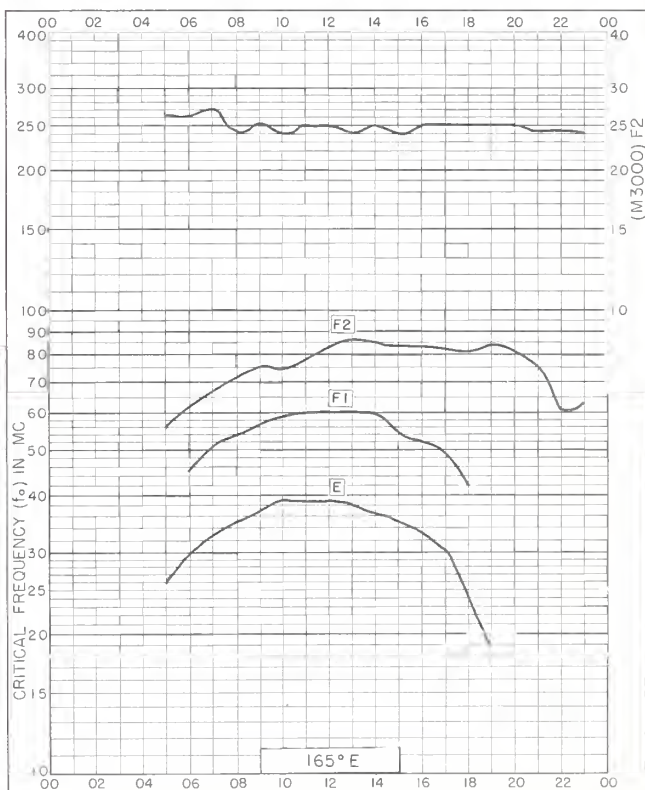


Fig. 76. CAMPBELL I.  
52.5°S, 169.2°E NOVEMBER 1956

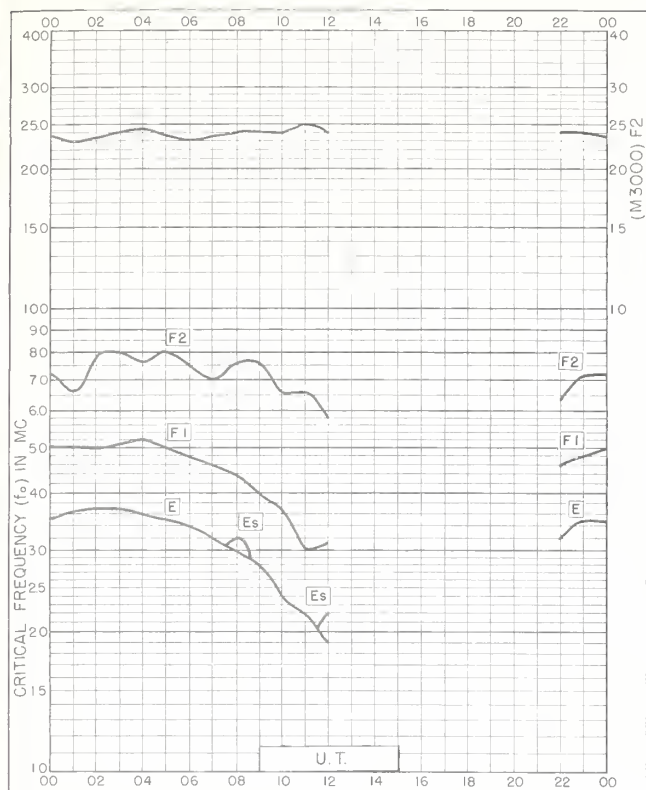


Fig. 77. TERRE ADELIE

66.7°S, 140.0°E

NOVEMBER 1956

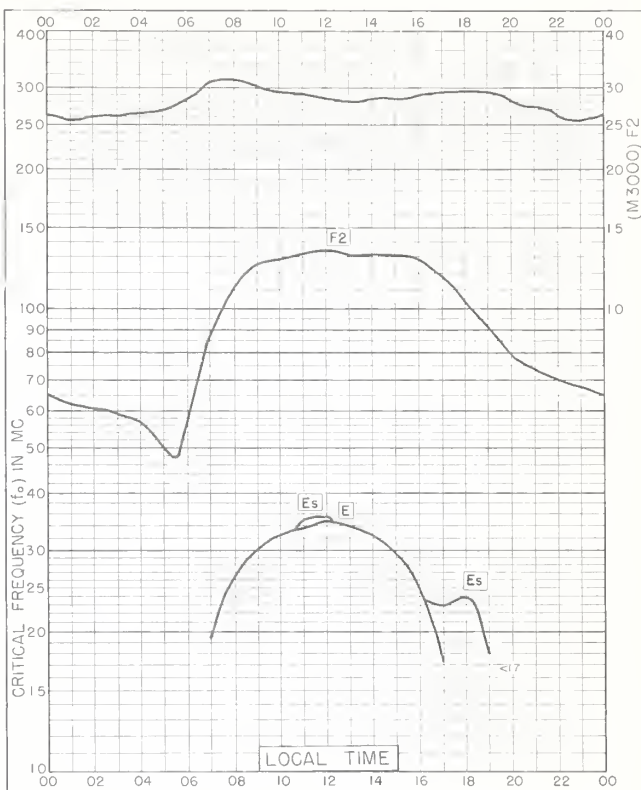


Fig. 78. FREIBURG, GERMANY

48.1°N, 7.8°E

OCTOBER 1956

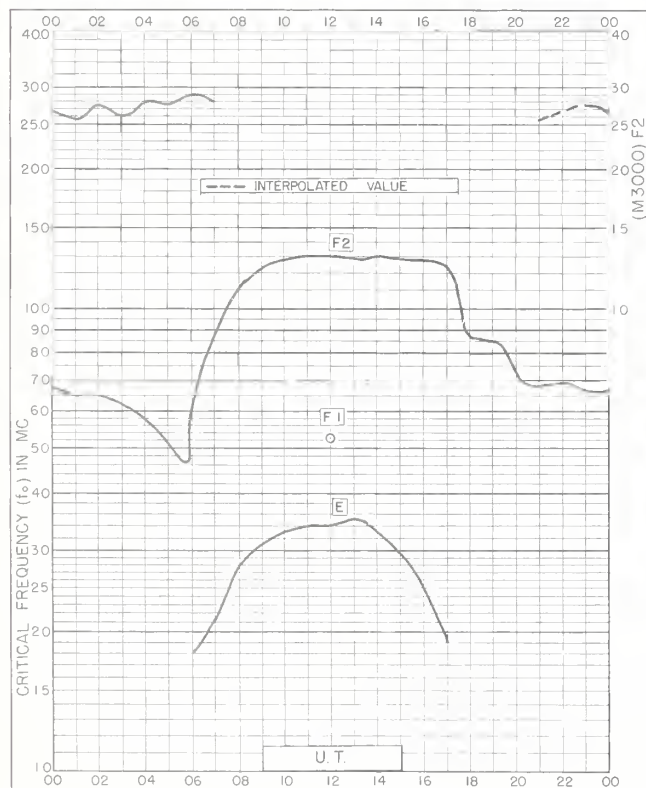


Fig. 79. POITIERS, FRANCE

46.6°N, 0.3°E

OCTOBER 1956

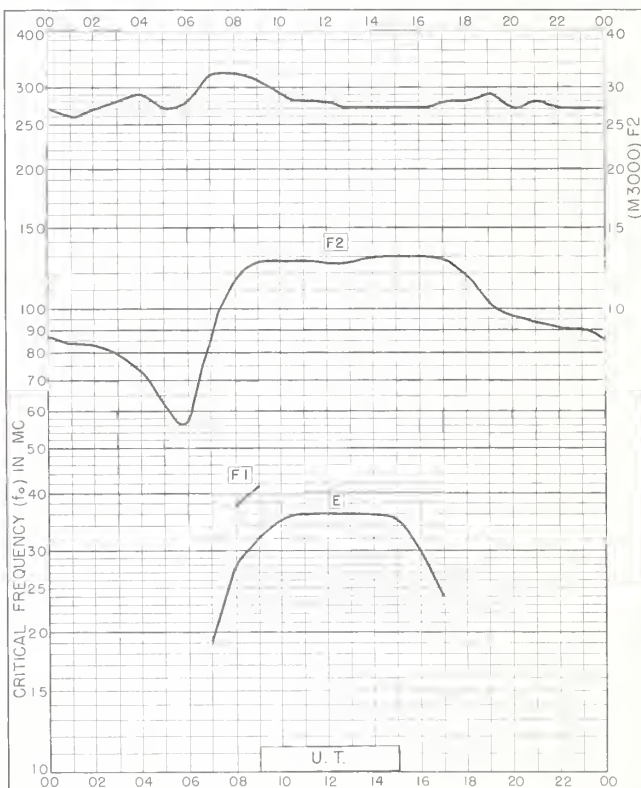


Fig. 80. CASABLANCA, MOROCCO

33.6°N, 7.6°W

OCTOBER 1956

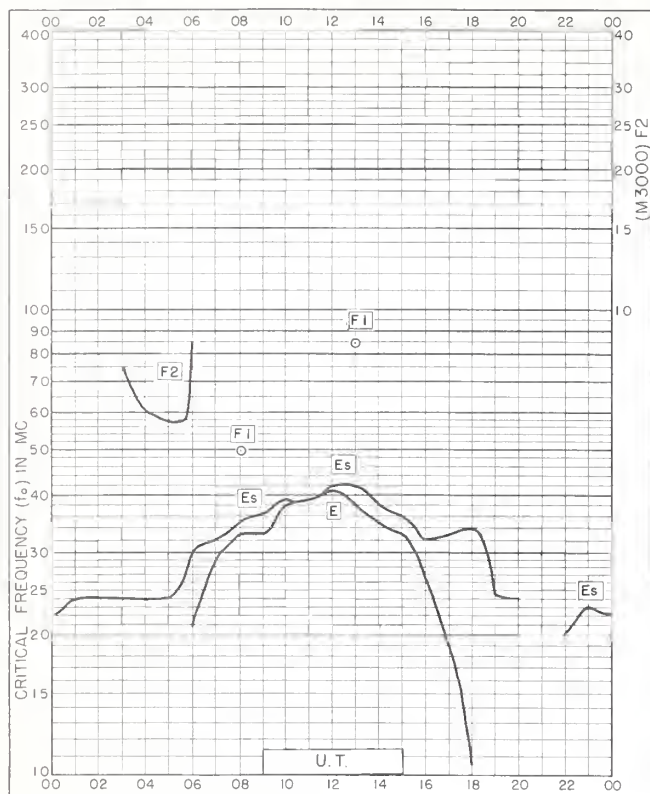


Fig. 81. TAMANRASSET, FRENCH W. AFRICA  
22.8°N, 5.5°E  
OCTOBER 1956

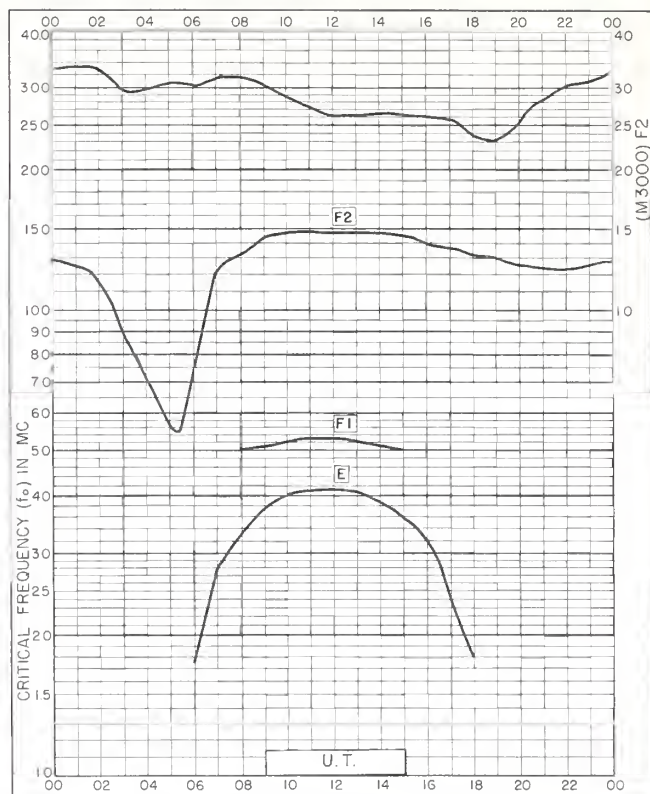


Fig. 82. DAKAR, FRENCH W. AFRICA  
14.8°N, 17.4°W  
OCTOBER 1956

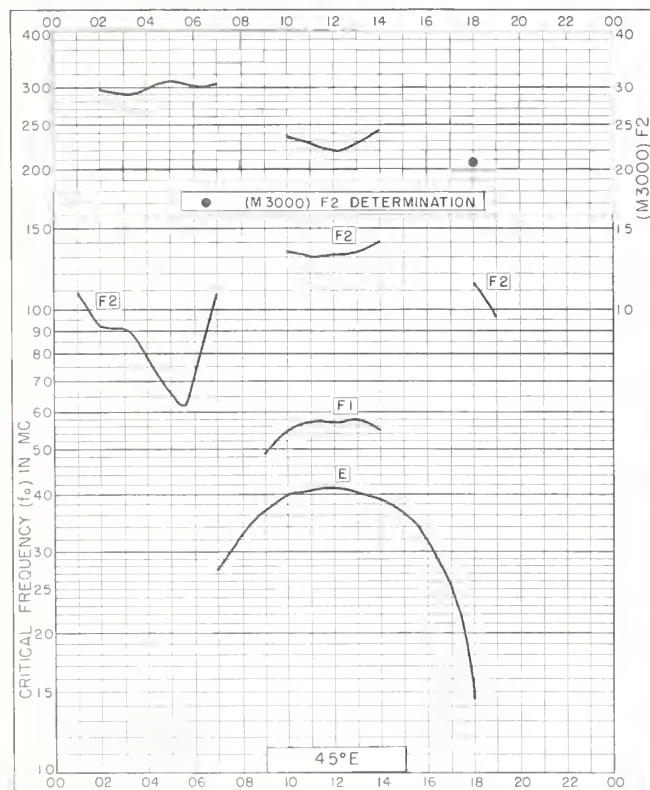


Fig. 83. DJIBOUTI, FRENCH SOMALILAND  
11.6°N, 43.2°E  
OCTOBER 1956

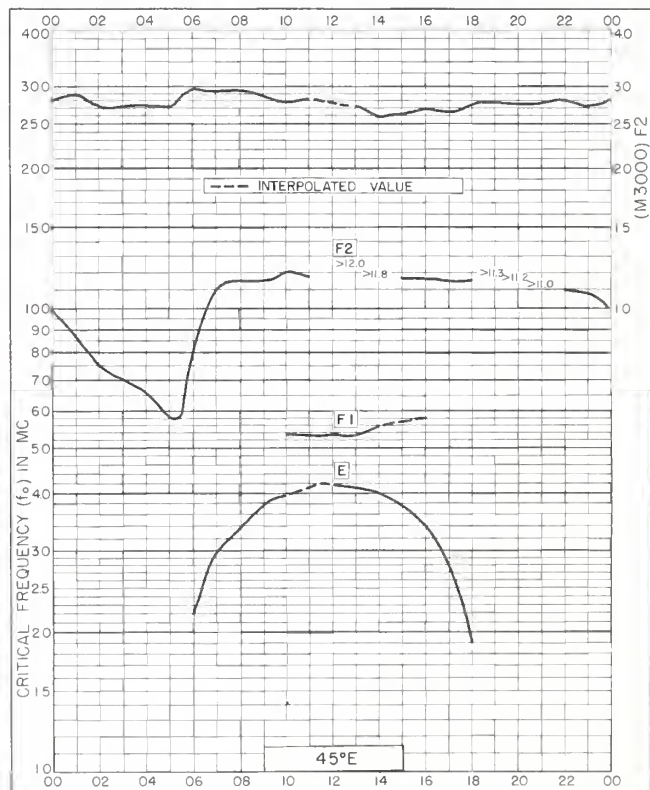


Fig. 84. TANANARIVE, MADAGASCAR  
18.8°S, 47.5°E  
OCTOBER 1956

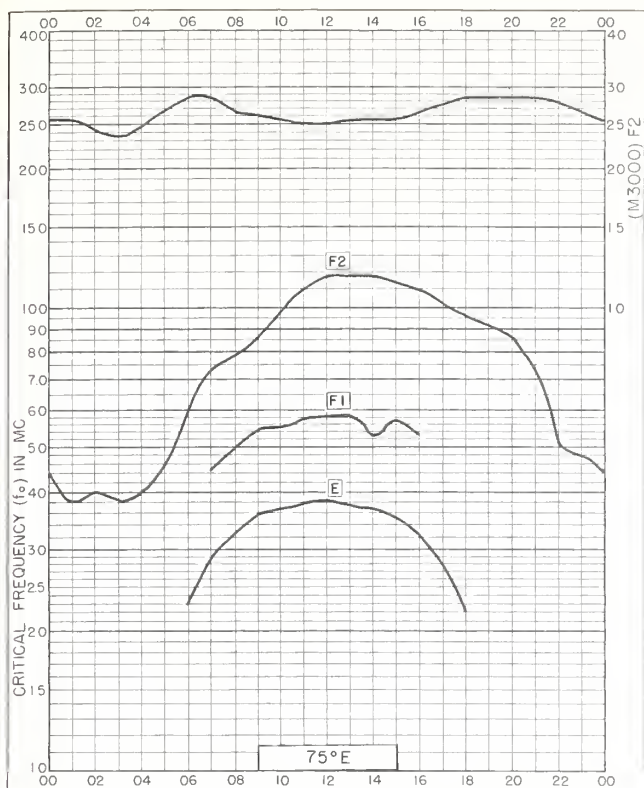


Fig. 85. KERGUELEN I.  
49.4°S, 70.3°E

OCTOBER 1956

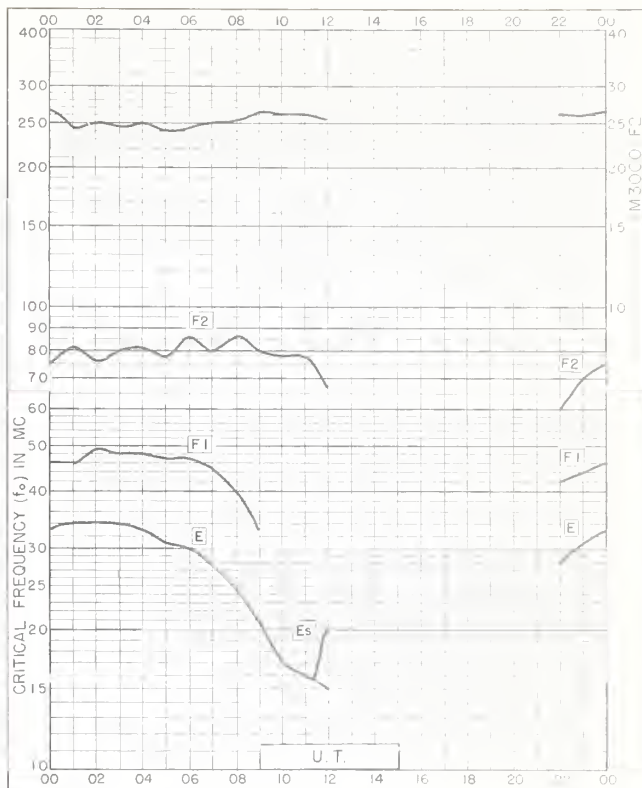


Fig. 86. TERRE ADELIE  
66.7°S, 140.0°E

OCTOBER 1956

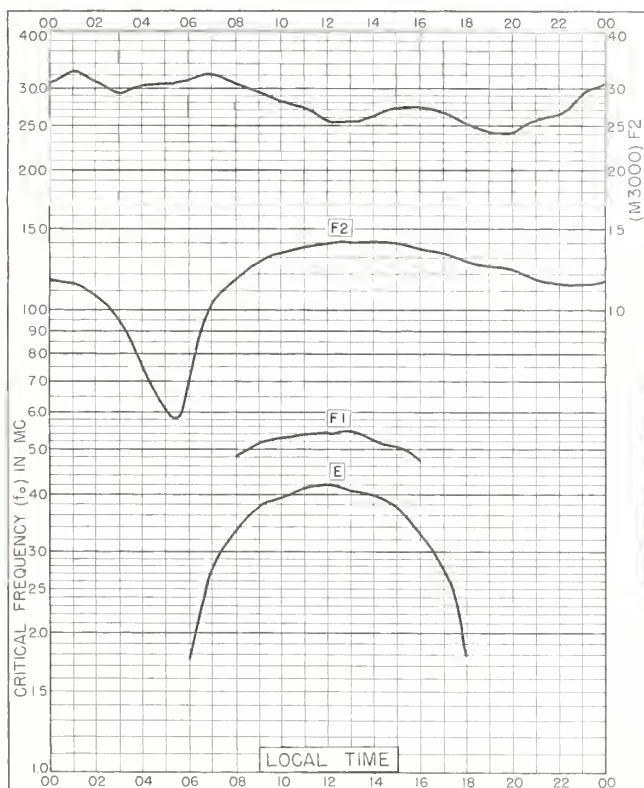


Fig. 87. DAKAR, FRENCH W. AFRICA  
14.7°N, 17.4°W

SEPTEMBER 1956

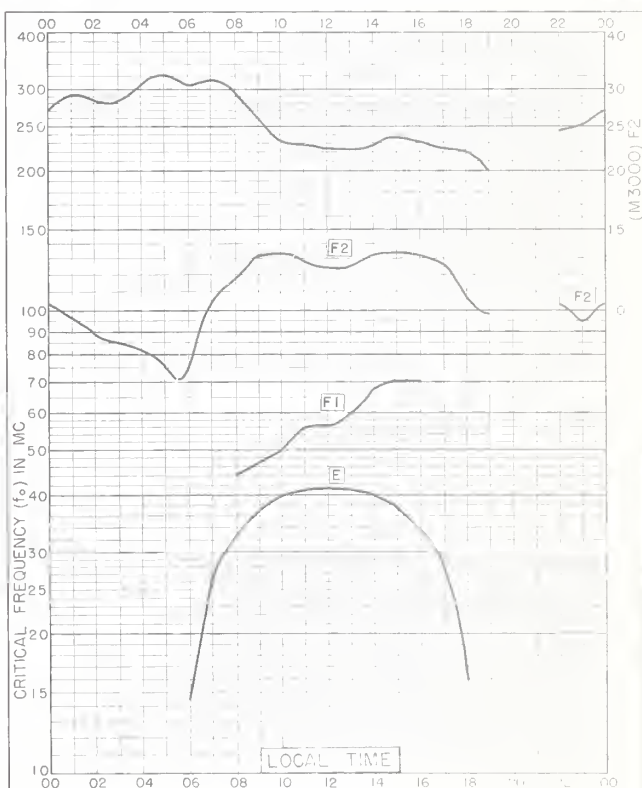


Fig. 88. DJIBOUTI, FRENCH SOMALILAND  
11.5°N, 43.1°E

SEPTEMBER 1956

The ionogram plot displays the critical frequency of the ionosphere layers (F2, F1, and E) as a function of local time. The x-axis represents local time from 00 to 00. The left y-axis represents critical frequency in MHz (10 to 40), and the right y-axis represents (M3000)F2 (25 to 40). The F2 layer curve shows a minimum around 0400 and a maximum around 1400. The F1 layer curve is only visible between 1000 and 1600. The E layer curve shows a minimum around 0500 and a maximum around 1200.

Local Time	F2 Critical Frequency (MHz)	(M3000)F2	F1 Critical Frequency (MHz)	E Critical Frequency (MHz)
0000	27.0	27.0	-	-
0200	25.5	25.5	-	-
0400	25.5	25.5	-	28.0
0600	32.0	32.0	-	29.0
0800	28.0	28.0	-	32.0
1000	27.5	27.5	55.0	35.0
1200	27.5	27.5	55.0	37.0
1400	28.0	28.0	55.0	35.0
1600	28.5	28.5	-	25.0
1800	29.0	29.0	-	-
2000	30.0	30.0	-	-
2200	28.0	28.0	-	-
0000	26.5	26.5	-	-

Ionogram plot for 165°E showing critical frequency ( $f_0$ ) in MC and virtual height ( $h'_p$ ) in M3000F2 versus time of day (00 to 24 hours). The plot displays three distinct traces labeled F2, F1, and E.

Time (Hours)	F2 ( $f_0$ in MC)	F1 ( $f_0$ in MC)	E ( $f_0$ in MC)
06	27	48	19
08	30	70	30
10	29	90	34
12	29	95	36
14	28	100	34
16	29	95	28
18	27	85	15
20	26	70	-
22	26	70	-
24	26	62	-

Figure 1 consists of five vertically stacked plots sharing a common x-axis representing time in Universal Time (U.T.) from 00 to 00. The top plot shows virtual height (km) on the y-axis (0 to 400) versus frequency (MHz) on the x-axis (0.0 to 2.2). It displays two traces: a solid line for the ordinary wave (O) and a dashed line for the extraordinary wave (X). The second plot shows virtual height (km) on the y-axis (0 to 400) versus frequency (MHz) on the x-axis (0.0 to 2.2) for the ordinary wave (O). The third plot shows virtual height (km) on the y-axis (0 to 400) versus frequency (MHz) on the x-axis (0.0 to 2.2) for the extraordinary wave (X). The fourth plot shows critical frequency ( $f_o$ ) in MHz on the y-axis (10 to 100) versus time (UT) on the x-axis (00 to 00). It contains two traces: a solid line for the ordinary wave (O) and a dashed line for the extraordinary wave (X). The bottom plot shows critical frequency ( $f_o$ ) in MHz on the y-axis (10 to 100) versus time (UT) on the x-axis (00 to 00). It contains a single solid line trace. A box labeled 'U.T.' is present in the bottom plot.

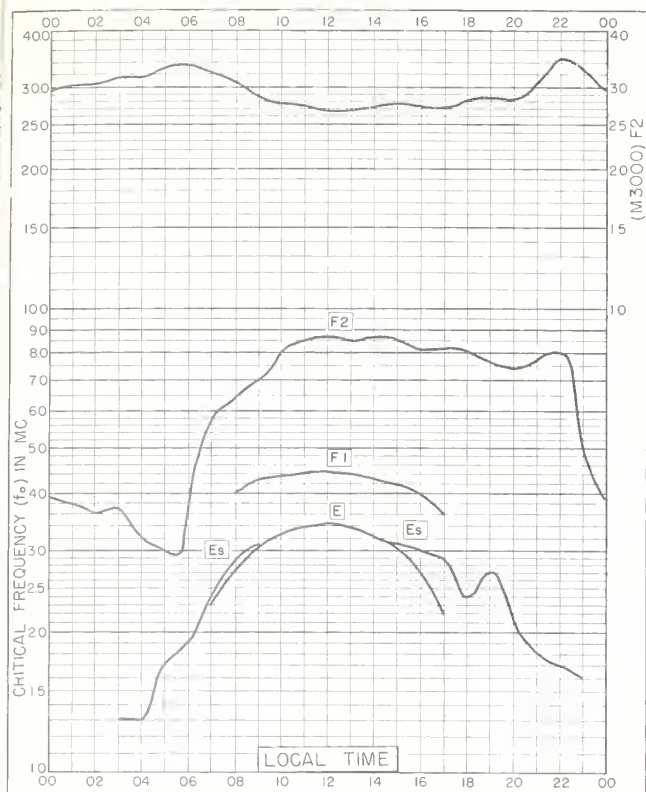


Fig. 93. LWIRO, CONGO  
2.3°S, 28.8°E DECEMBER 1954

NBS 503

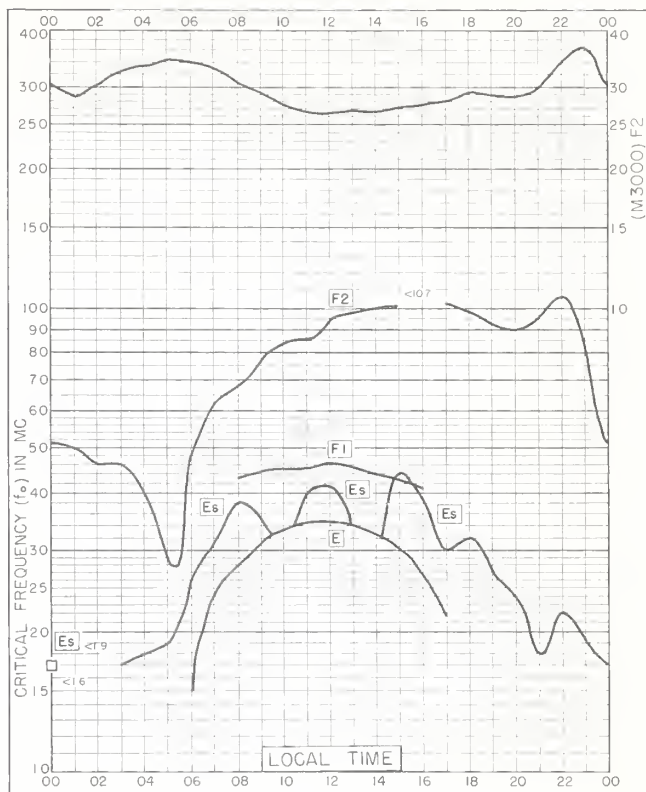


Fig. 94. LWIRO, CONGO  
2.3°S, 28.8°E NOVEMBER 1954

NBS 503



Fig. 95. LWIRO, CONGO  
2.3°S, 28.8°E OCTOBER 1954

NBS 503

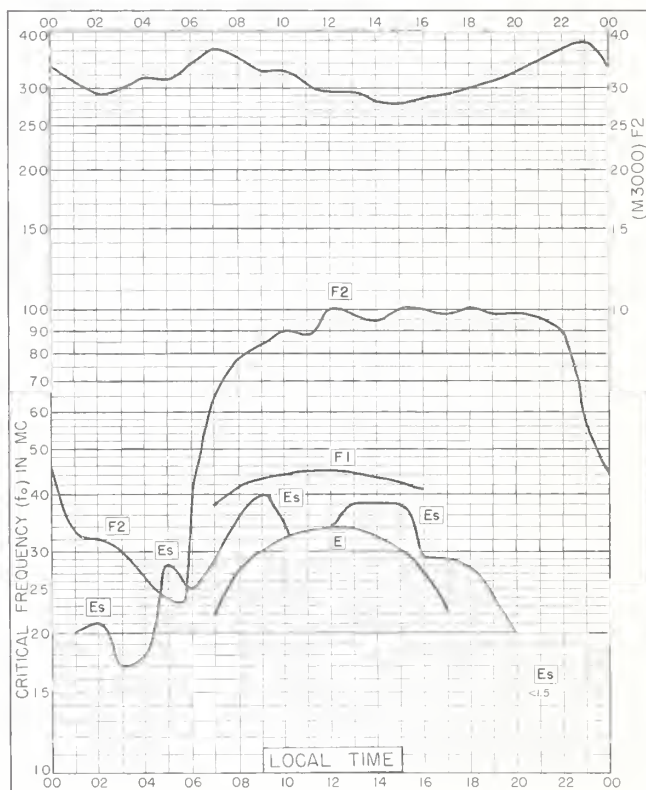


Fig. 96. LWIRO, CONGO  
2.3°S, 28.8°E SEPTEMBER 1954

NBS 503

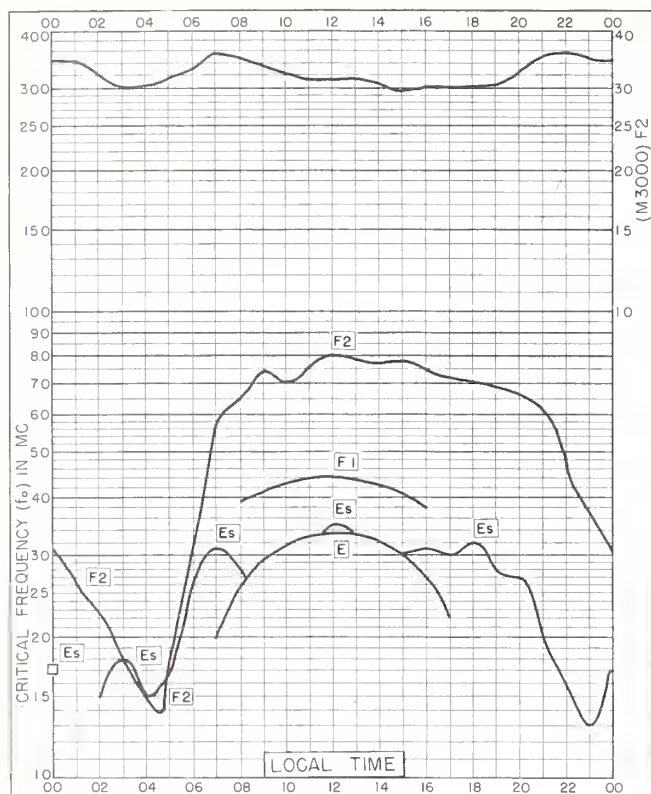


Fig. 97. LWIRO, CONGO  
2.3°S, 28.8°E

AUGUST 1954

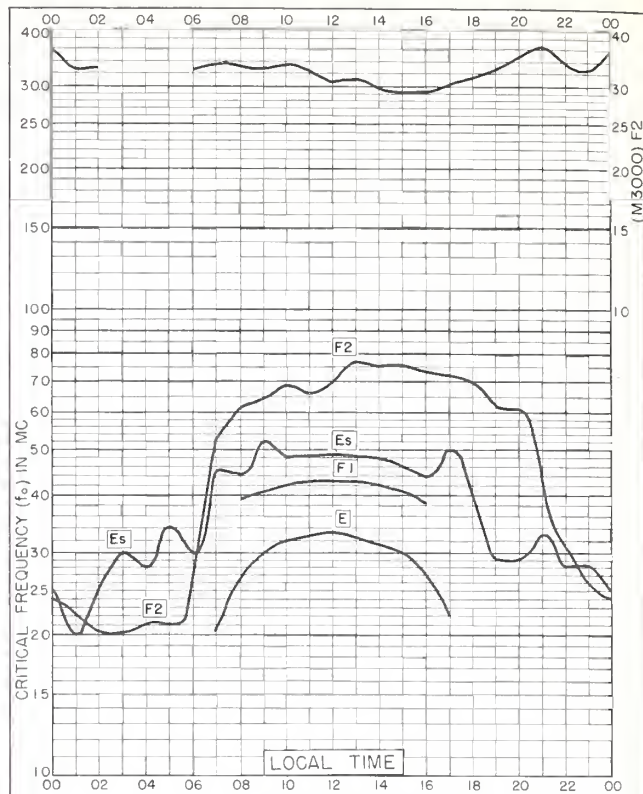


Fig. 98. LWIRO, CONGO  
2.3°S, 28.8°E

JULY 1954

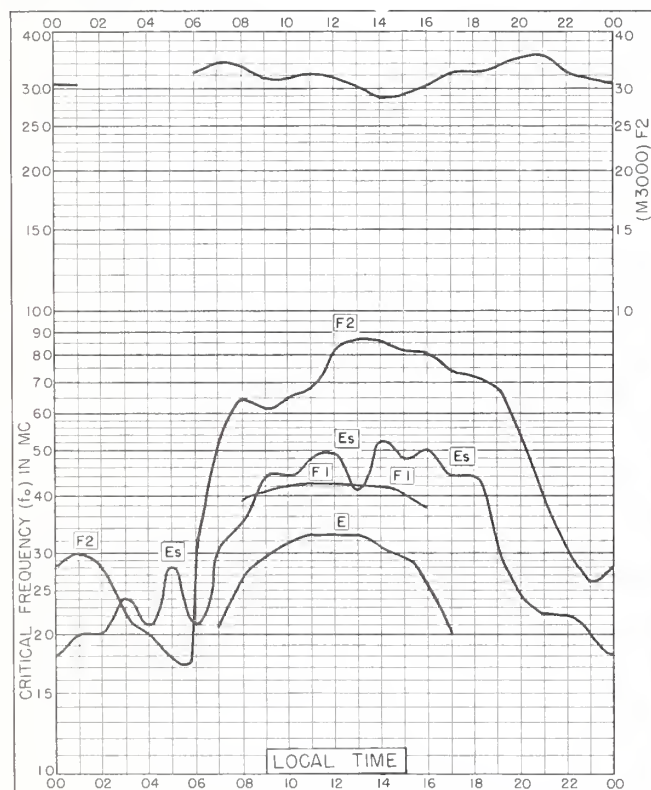


Fig. 99. LWIRO, CONGO  
2.3°S, 28.8°E

JUNE 1954



Fig. 100. LWIRO, CONGO  
2.3°S, 28.8°E

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